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Installation, user and maintenance manual

GAHP-GS/WS

water/water gas absorption heat pump

powered by gas and renewable energy

Revision: M
Code: D-LBR509

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1 PREFACE

This Installation, user and maintenance manual is a guide to the installation and operation of the Air-Water gas absorption heat pump GAHP-GS/WS.
This manual is specifically intended for:

- final users for the operation of the appliance according to their own requirements;
- Installation technicians (hydraulic and electrical) for a correct installation of the appliance.

The manual also contains:

- a section that describes all the operations necessary for the "first start-up" and for the "gas change" of the appliance, as well as the main maintenance operations;
- an "ACCESSORIES" section with a description of accessories available and their respective reference codes.
- (IN CASE) one or more APPENDIX sections in which are reported some "specific" information for a particular country.

References

If the appliance is connected to a Comfort Control Panel (see detail CCP in Figure 6.4 Comfort Control Panel e Accessory → 48) it is switched on and controlled by the Comfort Control Panel. In this case, refer to the manual supplied with it.
If the appliance is connected to a Direct Digital Controller (see Figure 6.3 CCI/DDC → 47) and the DDC is in controller mode, activation and control of the appliance will occur exclusively by operating the DDC. In this case, refer to the manual supplied with it.

Definitions, terms and icons

APPLIANCE: this term refers to the gas absorption heat pump GAHP-GS and/or gas absorption heat pump GAHP-WS.
CCP: "Comfort Control Panel".
CCI: "Comfort Control Interface" device.
DDC: digital control panel (Direct Digital Controller).
TAC: Technical Assistance Centre (authorised by Robur S.p.A.).
SYSTEM COLD SIDE: this term refers to the renewable source plant (geothermal probes or ground water).
SYSTEM HOT SIDE: this term refers to the primary hot water distribution system.
The **icons** in the edge of the manual have the following meanings:

= DANGER

= WARNING

= NOTE

= START OF OPERATING PROCEDURE

= REFERENCE to another part of the manual or other document

2 SAFETY WARNINGS

Packing items (plastic bags, polystyrene foam, nails, etc.) must be kept out of the reach of children, as they are potentially dangerous.

The appliance must only be used for the purposes for which it has been designed. Any other use is considered inappropriate and therefore dangerous. The manufacturer does not accept any contractual or extra-contractual liability for any damage caused by improper use of the appliance.

The appliance is not intended to be used by persons (including children) whose physical, sensory and mental capacities are impaired, or who lack the necessary experience and knowledge, unless they are supervised or instructed in its use by persons responsible for their safety. Children must be supervised to ensure that they do not play with the appliance.

The unit uses a water/ammoniac absorption cycle for hot/cold water production. The ammoniac is in water solution inside a sealed circuit tested for tightness by the manufacturer. In case of coolant leaks, switch off the electrical power and gas supplies only if this can be done in total safety. Contact your Authorised Service Centre.

If installed indoors, the safety valve must be ducted. Refer to Chapter 5.9 SAFETY VALVE DISCHARGE ROUTING → 43 of this manual for instructions. The unit MAY NOT BE OPERATED if the safety valve is not ducted.

Frequent topping up of the hydraulic with water can result in damage due to scale and corrosion, depending on the quality of the water being used. Make sure the system is water tight and that the expansion tank is operational.

Concentrations of chlorides or free chlorine in the circuit above the values given in Table 5.1 Chemical and physical parameters of water → 29 will damage the unit's water/ammonia exchanger.

Close the gas supply before working on the gas circuit. On completing work on the gas circuit, check for leakages as required by established regulations.

Do not operate the appliance if dangerous conditions exist: odour of gas in the grid or near the appliance; problems with the electrical/gas grid or hydraulic circuit; parts of the appliance submerged in water or otherwise damaged; controls or safety components bypassed or defective. In these cases, ask for assistance to professionally qualified personnel.

If you smell gas:

- do not use electrical devices such as telephones, multimeters or other equipment that can cause sparks next to the appliance;
- shut off gas supply closing the isolation valve;
- cut off electrical power opening the main breaker upstream of the appliance (to be provided by the electrical installer in an appropriate panel);
- ask for assistance to professionally qualified personnel from a telephone distant from the appliance.

Moving parts, also during the appliance's start-up and shut-down cycles. Do not remove guards. Make sure the appliance cannot be started up inadvertently.

POISONING HAZARD

Make sure the flue gas components are tight and compliant with established regulations. After any intervention on these parts, check for tightness.

If the appliance is installed indoors, insufficient or non-conforming ventilation (see installation instructions) can result in hazardous leaks of combusted gases.

- Make sure the ventilation and aeration outlets conform to the installation instructions.
- If the non-conformity cannot be resolved immediately, do not start up the appliance.
- Notify the plant operator of the non-conformity and any attendant hazards.

BURN HAZARD

The appliance contains numerous hot parts. Do not open up the appliance or touch the fumes outlet pipe. If necessary, contact your Technical Assistance Centre.

The appliance has a sealed circuit classified as pressure equipment, i.e. with internal pressure higher than atmospheric pressure. The fluids contained in the sealed circuits are harmful if swallowed or inhaled, or if they come into contact with the skin. Do not carry out any operation on the sealed circuit or on its valves.

ELECTROCUTION HAZARD

- Use only approved components for the electrical connections, as specified by the manufacturer.
- Disconnect the electrical power supply before working on the appliance's internal electrical equipment (electrical panel, motors, control board, etc.).
- Make sure the appliance cannot be started up inadvertently.

The electrical safety of the appliance is ensured only when it is correctly connected to an efficient grounding system, compilant with current safety regulations.

DAMAGE DUE TO AGGRESSIVE SUBSTANCES IN THE AIR SUPPLY

Hydrogenated hydrocarbons, which contain chlorine and fluorine compounds, will increase the corrosion of the unit.

Make sure the air supply is free of aggressive substances.

ACID CONDENSATE

Drain out the condensate produced during combustion as indicated in paragraph 5.5 CONDENSATE DISCHARGE → 31.

EXPLOSIVE/FLAMMABLE MATERIALS HAZARD

Do not use or store flammable materials (paper, solvents, paint, etc.) in the vicinity of the appliance.

SUGGESTIONS FOR THE CLIENT

Stipulate a maintenance contract with an authorised specialist contractor for the annual inspection of the appliance and maintenance when needed.
Maintenance and repairs may only be done a contractor legally authorised to work on gas appliances and equipment.
Only accept and use original spare parts.

3 OVERVIEW AND TECHNICAL FEATURES

In this section you will find general information, hints on the operating principle of the appliance and its manufacturing features. This section also contains technical data and dimensional drawings of the appliance.

3.1 GENERAL INFORMATION

This manual is an integral and essential part of the product and must be delivered to the user together with the appliance.

Conformity to CE standards

The absorption heat pumps of the GAHP series are certified as conforming to standard EN 12309-1 and -2 and comply with the essential requirements of the following Directives:

- Gas Directive 90/396/EEC and subsequent modifications and additions.
- Efficiency Directive 92/42/EEC and subsequent modifications and additions.
- Electromagnetic Compatibility Directive 89/336/EEC and subsequent modifications and additions.
- Low Voltage Directive 89/336/EEC and subsequent modifications and additions.
- "Machinery Directive" 2006/42/EC.
- Pressurised Equipment Directive 97/23/EEC and subsequent modifications and additions.
- UNI EN 677 Specific requirements for condensing boilers with nominal thermal capacity up to 70 kW.
- EN 378 Refrigerating systems and heat pumps.

The emission values of nitrogen oxides (NOx) of gas absorption heat pumps of the GAHP series are lower than 60 mg/kWh, in compliance with the requirements of the standard RAL UZ 118 "Blauer Engel".

Information regarding the above EC certifications is given in Paragraph 3.4 TECHNICAL DATA → 12, as well as on the Nameplate of the appliance itself.

Installation and regulatory references

On receiving the appliance at the installation site, before placing into final position, check there are no signs of transportation damages of the external panels or packaging.

Packing materials must be removed only after the appliance has been positioned on site. After removing the packing materials, ensure that the appliance is intact and complete.

Installation of the appliance may only be carried out by professionally qualified personnel by i.e. firms qualified according to the current legislation of the country of installation.

"Professionally qualified personnel" means personnel with specific technical competence in the sector of heating/cooling installations and gas appliances.

Installation of the appliance must be carried out in compliance with current local and national regulations regarding the design, installation and maintenance of heating and cooling installations and in accordance with the manufacturer's instructions.
In particular, current regulations regarding the following aspects must be respected:

- Gas equipment.
- Electrical equipment.
- Heating installations and heat pumps

- Every other standard and regulation concerning the installation of equipment for summer and winter air conditioning using gas fuel.

The manufacturer does not accept any contractual or extra-contractual liability for any damage caused by errors in installation and/or failure to observe the abovementioned regulations and the instructions supplied by the manufacturer itself.

Once the appliance is installed

The installer must provide the owner with a Declaration stating that the installation has been completed in compliance with state-of-the-art practices, current national and local regulations, and recommendations by the manufacturer.

Before contacting Technical Assistance for commissioning and first start-up, the installer must ensure that:

- the electricity and gas grids characteristics correspond to the specifications on the nameplate of the appliance;
- the gas supply pressure is compliant with the value reported in Table 5.2 Network gas pressure → 31 (considering a tolerance of ±15%);
- the appliance is fed by the type of gas for which it is designed;
- the gas supply system and water distribution system are sealed;
- the gas and electricity supply systems are properly rated for the capacity required by the appliance and are equipped with all safety and control devices required by current regulations

Check that no safety and control devices are excluded, by-passed or not properly working.

Initial activation procedure

The complete procedure for the first start up of the appliance must be carried out by an authorized technician according to the instructions supplied by the manufacturer.
To carry out entire procedure correctly, follow the instructions in Paragraph 7.1 PROCEDURE FOR FIRST START UP → 73.

Warranty could be invalidated if the *first start up* is not carried out and validated by an authorized technician.

Operation and maintenance of the appliance

To ensure the correct operation of the appliance and to avoid failures, control of the switching on and off of the appliance must be done in line with the requirements of the various types of installation.

- If the appliance is connected to the Comfort Control Panel (see Figure 6.4 Comfort Control Panel e Accessory → 48 detail CCP), the appliance may be switched on and off exclusively by the CCP itself.
- If the appliance is connected to the DDC (see Figure 6.3 CCI/DDC → 47), the appliance may be switched on and off exclusively by the DDC itself.
- If the appliance is NOT connected to a CCP/DDC, the appliance may be switched on and off exclusively by a switch on the consent circuit.

The appliance must never normally be switched on and off by shutting off the power supply upstream of the Controle Device (CCP, DDC or consent switch) before having used the latter first and waited for the shutdown cycle to end (approximately 7 minutes). The shutdown cycle terminates when the hydraulic pump switches off (no parts in motion).

Shutting off the power supply while the appliance is running can cause permanent damages to internal components!

If the appliance fails to operate correctly, with the consequent indication of the Machine code, follow the instructions of Paragraph 9.1 OVERVIEW AND OPERATING CODES/ TROUBLESHOOTING → 82.

In the event of failure of the appliance and/or breakage of any component, do not attempt to repair and/or restore operation; proceed as follows:

- shut off the appliance immediately (if possible and if no dangerous condition exists) through the controls (CCP, DDC or permissive switch) and wait for the end of the cooling down cycle (around 7 minutes);
- immediately get in touch with Technical Assistance.

Proper **ordinary maintenance** ensures the efficiency and good operation of the appliance over time.
Carry out maintenance operations according to the instructions supplied by the manufacturer.
For the maintenance of internal components of the appliance, contact Technical Assistance; for other maintenance requirements, see Paragraph 7.2 MAINTENANCE → 77.
Any repair of the appliance must be carried out by Technical Assistance, using only original spare parts.

Failure to observe the indications above may compromise the operation and safety of the appliance, and may invalidate warranty.

If the appliance is to be disposed of, contact the manufacturer for its correct disposal.

If the appliance is to be sold or transferred to another owner, ensure that this "Installation, user and maintenance manual" is handed over to the new owner and installer.

3.2 NOTES ON OPERATION OF THE APPLIANCE

The appliance uses the water/ammoniac absorption thermodynamic cycle (H_20 – NH_3) to produce hot water, drawing the required energy from the ground (GAHP-GS) or, in the case of the GAHP-WS, from ground water.
The water/ammonia thermodynamic cycle used in the unit GAHP-GS/WS is realized in a hermitically sealed circuit, directly verified by the manufacturer to ensure the perfect tightness of all joints, thus making refrigerant top-ups completely unnecessary.

Description and general characteristics

The **GAHP-GS/WS** is a modulating condensation heat pump: the thermal power modulates from 100% to 50% depending on load, to ensure optimal comfort.
The water/water gas absorption heat pump **GAHP-WS** produces hot water to +65°C for heating purposes and up to +70°C for sanitary hot water.
The geothermal absorption heat pump **GAHP-GS** is available in the following versions:

- Version **HT**: optimised for high temperature heating systems (radiators, fan coils); it produces hot water to +65°C for heating purposes and up to +70°C for sanitary hot water.
- Version **LT:** optimised for low temperature distribution systems (heating floor, low temperature radiators); it produces hot water up to +55°C in heating mode and up to +70°C in Domestic Hot Water mode.

The modulating function (both in terms of combustion and flow rate) combined with fumes condensation results in efficiencies of up to 172%.
The GAHP-GS/WS can operate in ambient temperatures of 0°C to +45°C.
The GAHP heat pump can be controlled with the CCP/DDC or with a switch on the consent circuit.
During operation, combustion products are exhausted via the discharge terminal at the left side of the appliance (see Figure 3.1 Size → 15). The fumes outlet must be connected to a flue (for further details, see Paragraph 5.7 EXHAUST FLUE GAS → 37).
The appliance powered by 230 V 1N 50 Hz electrical power - .

3.3 TECHNICAL MANUFACTURING CHARACTERISTICS

The appliance is supplied with the following technical manufacturing characteristics, control and safety components:

- Steel sealed circuit, externally treated with epoxy paint.
- Sealed combustion chamber suited for type C installation.
- Metal mesh radiant burner equipped with ignition electrodes and flame detection managed by an electronic flame control box.
- Titanium stainless steel shall-and-tube heat exchanger, with external insulation.
- Tube coil heat recovery [AISI 304L] (for acid condensate).

Control and safety components

- S61 electronic board with integrated microprocessor, LCD display and control knob, complete with Mod10 auxiliary card to control thermal capacity and primary pump modulation (see Figures 6.1 Electronic board S61 → 46 and 6.2 Mod10 controller → 47).
- Primary circuit water flowmeter (hot side).
- Plant water flowmeter (cold side).
- Sealed circuit high temperature limit thermostat, with manual reset.
- Flue temperature thermostat 120 °C, with manual reset.
- Sealed circuit safety relief valve.
- Safety by-pass valve, between high and low pressure parts of the sealed circuit.
- Antifreeze functions for hydraulic circuit.
- Ionization flame control box.
- Double shutter electric gas valve.
- Condensate discharge sensor.

3.4 TECHNICAL DATA

Table 3.1 – GS HT/LT technical data

			GAHP GS LT	GAHP GS HT
OPERATION WHEN HEATING				
OPERATING POINT B0W50* (Brine inlet 0°C, hot Water outlet +50°C)	G.U.E. gas usage efficiency	%	150 (1)	149 (1)
	Thermal power delivered	kW	37,7 (1)	37,6 (1)
	Power recovered from renewable source	kW	12,4	12,6
OPERATING POINT B0W35* (Brine inlet 0°C, hot Water outlet +35°C)	G.U.E. gas usage efficiency	%	170 (1)	--
	Thermal power delivered	kW	42,6 (1)	--
	Power recovered from renewable source	kW	17,0	--
OPERATING POINT B0W65* (Brine inlet 0°C, hot Water outlet +65°C)	G.U.E. gas usage efficiency	%	--	125 (1)
	Thermal power delivered	kW	--	31,5 (1)
	Power recovered from renewable source	kW	--	7,9
Thermal capacity	Nominal (1013 mbar - 15°C)	kW	25,7	
	true peak	kW	25,2	
NOx emission class			5	
NOx emission		ppm	25	
CO emission		ppm	36	
Hot water delivery temperature	maximum for heating	°C	55	65
	maximum for DHW	°C	70	
Hot water return temperature	maximum heating	°C	45	55
	maximum for DHW	°C	60	
	minimum temperature in continuous operation**	°C	20	30
Hot water flow rate	nominal	l/h	3250	3170
	maximum	l/h	4000	
	minimum	l/h	1400	
Hot water pressure drop	for nominal water flow (B0W50)	bar	0,49 (2)	
Ambient air temperature (dry bulb)	maximum	°C	45	
	minimum	°C	0	
Thermal differential	nominal	°C	10	
gas consumption	methane G20 (nominal)	m3/h	2,72 (3)	
	G30 (nominal)	kg/h	2,03 (4)	
	G31 (nominal)	kg/h	2,00 (4)	
RENEWABLE SOURCE OPERATING CONDITIONS				
Renewable source water flow rate (with 25% glycol)	nominal (B0W50)	l/h	3020	
	maximum	l/h	4000	
	minimum	l/h	2000	
Renewable source pressure drop	at nominal flow rate	bar	0,51 (2)	
Renewable source water return temperature	maximum	°C	45	
Renewable source delivery water temperature	minimum	°C	-10	-5
ELECTRICAL SPECIFICATIONS				
Power supply	Voltage	V	230	
	TYPE		SINGLE PHASE	
	Frequency	50 Hz supply	50	
Electrical power absorption	nominal	kW	0,47 (5)	
Degree of protection	IP		X5D	
INSTALLATION DATA				
Level of acoustic pressure at 10 meters (maximum)		dB(A)	39 (7)	
Minimum storage temperature		°C	-30	
Maximum operating pressure		bar	4	
Maximum condensation water flow rate		l/h	4,0	
Water content inside the apparatus	HOT SIDE	l	4	
	COLD SIDE	l	3	
Water fitting	TYPE		F	
	thread	" G	1 1/4	
Gas fitting	TYPE		F	
	thread	" G	3/4	
Safety valve outlet channel fitting		" G	1 1/4	
Fume outlet	Diameter ( )	mm	80	
	Residual head	Pa	80	
	Product configuration		C63	

			GAHP GS LT	GAHP GS HT
Size	width	mm	848 (6)	
	height	mm	1278	
	depth	mm	690	
Weight	In operation	kg	300	
GENERAL INFORMATION				
INSTALLATION MODE			C13, C33, C43, C53, C63, C83, B23P, B33	
COOLING FLUID	AMMONIA R717	kg	7	
	WATER H2O	kg	10	
MAXIMUM PRESSURE OF THE COOLING CIRCUIT		bar	35	

* data tested by VDE and DVGW-Forschungsstelle.
** in transient operation, lower temperatures are allowed

Notes:

1. As per EN12309-2 evaluated on actual thermal capacity. For operating conditions other than nominal, refer to the Design Manual.
2. For flow rates different from the nominal refer to the Design Manual.
3. PCI 34.02 MJ/m3 (1013 mbar – 15 ° C).
4. PCI 46.34 MJ/kg (1013 mbar – 15 ° C).
5. ± 10% depending on power voltage and absorption tolerance of electric motors.
6. Overall dimensions excluding fumes pipes (see Figure 3.1 Size → 15).
7. Free field, frontal, directionality factor 2.

Table 3.2 – WS technical data

			GAHP WS
OPERATION WHEN HEATING			
OPERATING POINT W10W50	G.U.E. gas usage efficiency	%	166 (1)
	Thermal power delivered	kW	41,6 (1)
	Power recovered from renewable source	kW	16,6
OPERATING POINT W10W65	G.U.E. gas usage efficiency	%	143 (1)
	Thermal power delivered	kW	35,8 (1)
	Power recovered from renewable source	kW	11,5
Thermal capacity	Nominal (1013 mbar - 15°C)	kW	25,7
	true peak	kW	25,2
NOx emission class			5
NOx emission		ppm	25
CO emission		ppm	36
Hot water delivery temperature	maximum for heating	°C	65
	maximum for DHW	°C	70
Hot water return temperature	maximum heating	°C	55
	minimum temperature in continuous operation**	°C	20
Hot water flow rate	nominal	l/h	3570
	maximum	l/h	4000
	minimum	l/h	1400
Hot water pressure drop	for nominal water flow rate(W10W50)	bar	0,57 (2)
Ambient air temperature (dry bulb)	maximum	°C	45
	minimum	°C	0
Thermal differential	nominal	°C	10
gas consumption	methane G20 (nominal)	m3/h	2,72 (3)
	G30 (nominal)	kg/h	2,03 (4)
	G31 (nominal)	kg/h	2,00 (4)
RENEWABLE SOURCE OPERATING CONDITIONS			
Renewable source water flow rate	nominal (W10W50)	l/h	2850
	maximum	l/h	4700
	minimum	l/h	2300
Renewable source pressure drop	at nominal flow rate	bar	0,38 (2)
Renewable source water return temperature	maximum	°C	45
Renewable source delivery water temperature	minimum	°C	3
ELECTRICAL SPECIFICATIONS			

			GAHP WS
Power supply	Voltage	V	230
	TYPE		SINGLE PHASE
	Frequency	50 Hz supply	50
Electrical power absorption	nominal	kW	0,47 (5)
Degree of protection	IP		X5D
INSTALLATION DATA			
Level of acoustic pressure at 10 meters (maximum)		dB(A)	39 (7)
Minimum storage temperature		°C	-30
Maximum operating pressure		bar	4
Maximum condensation water flow rate		l/h	4,0
Water content inside the apparatus	HOT SIDE	l	4
	COLD SIDE	l	3
Water fitting	TYPE		F
	thread	" G	1 1/4
Gas fitting	TYPE		F
	thread	" G	3/4
Safety valve outlet channel fitting		" G	1 1/4
Fume outlet	Diameter ( )	mm	80
	Residual head	Pa	80
	Product configuration		C63
Size	width	mm	848 (6)
	height	mm	1278
	depth	mm	690
Weight	In operation	kg	300
GENERAL INFORMATION			
INSTALLATION MODE			C13, C33, C43, C53, C63, C83, B23P, B33
COOLING FLUID	AMMONIA R717	kg	7,7
	WATER H2O	kg	10
MAXIMUM PRESSURE OF THE COOLING CIRCUIT		bar	35

** in transient operation, lower temperatures are allowed.

Notes:

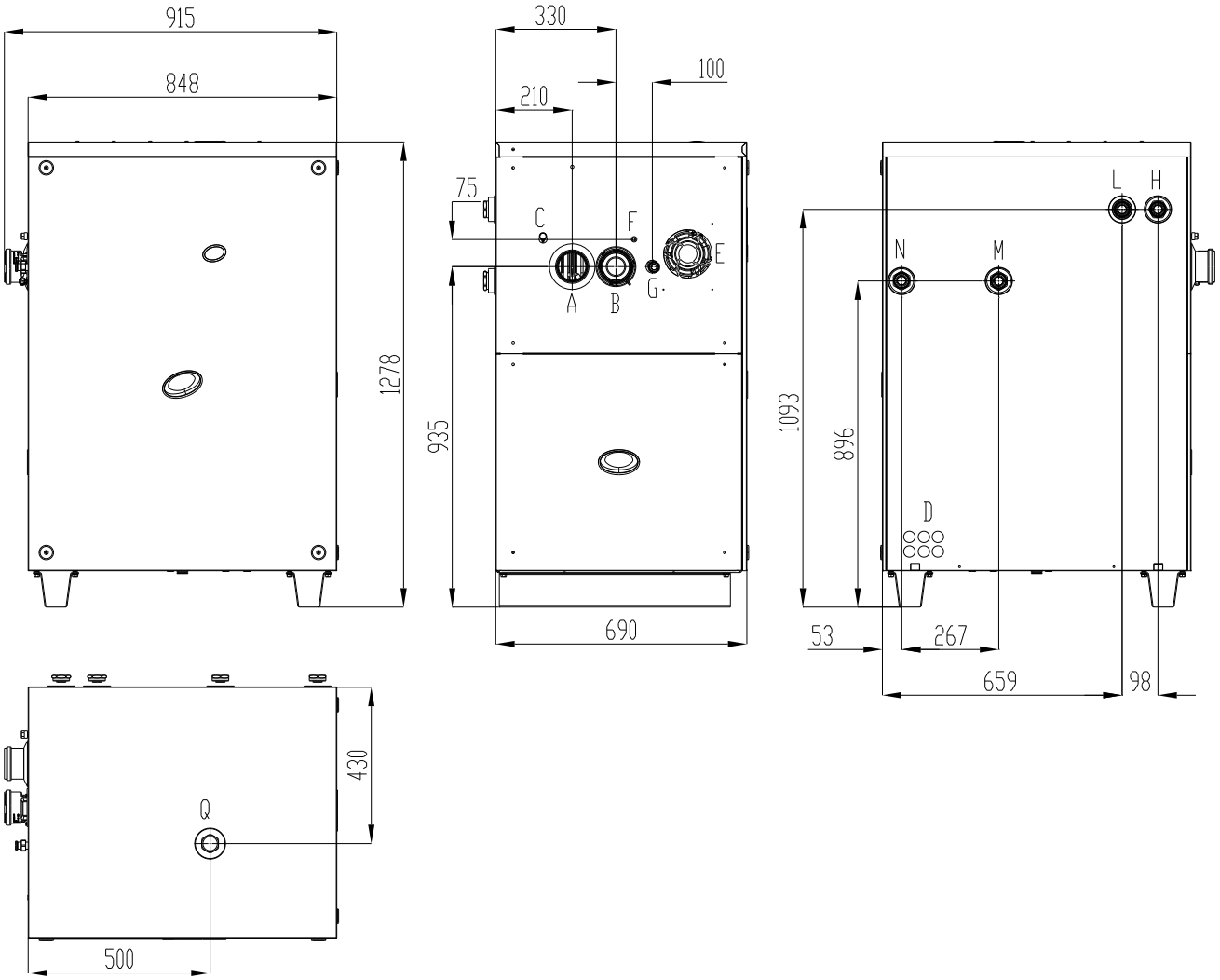
1. As per EN12309-2 evaluated on actual thermal capacity. For operating conditions other than nominal, refer to the Design Manual.
2. For flow rates different from the nominal refer to the Design Manual.
3. PCI 34.02 MJ/m3 (1013 mbar – 15 ° C).
4. PCI 46.34 MJ/kg (1013 mbar – 15 ° C).
5. ± 10% depending on power voltage and absorption tolerance of electric motors.
6. Overall dimensions excluding fumes pipes (see Figure 3.1 Size → 15).
7. Free field, frontal, directionality factor 2.

Table 3.3 – PED data

			GAHP GS LT	GAHP GS HT	GAHP WS
PED data					
COMPONENTS UNDER PRESSURE	Generator	l	18,6		
	Leveling chamber	l	11,5		
	Evaporator	l	3,7		
	Cooling volume transformer	l	4,5		
	Absorber/condenser	l	3,7		
	Cooling absorber solution	l	6,3		
	Solution pump	l	3,3		
TEST PRESSURE (IN AIR)		bar g	55		
SAFETY VALVE PRESSURE CALIBRATION		bar g	35		
FILLING RATIO		kg of NH3/l	0,137		0,159
"SEALED SYSTEM" TARE		kg	165		
FLUID GROUP			GROUP 1°		

3.5 DIMENSIONS AND SERVICE PANEL

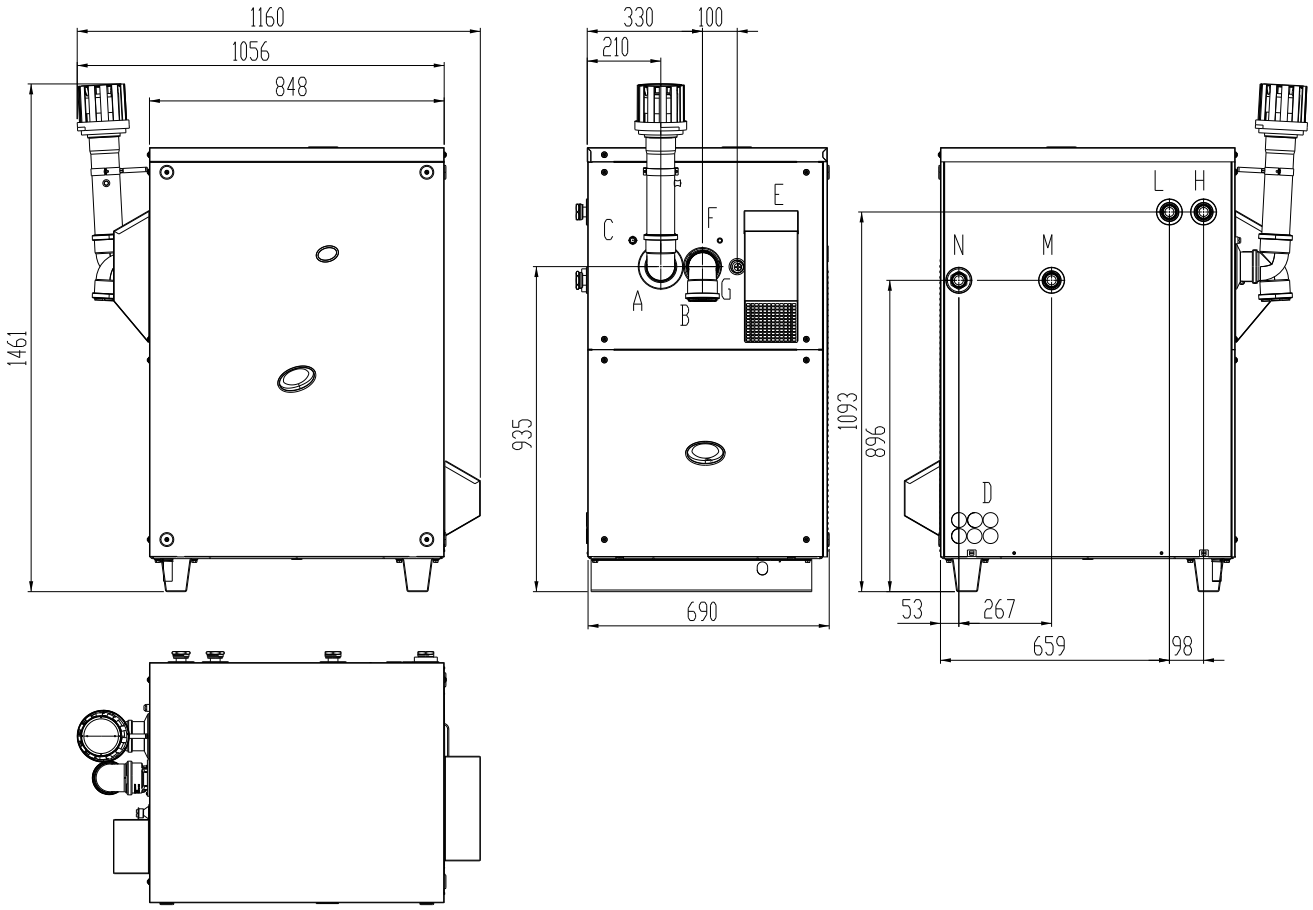
Figure 3.1 – Size



LEGEND

A	Fumes outlet dia 80
B	Combustion air intake dia 80
C	Manual reset fumes thermostat
D	Power cable input
E	Cooling fan
F	Appliance on indicator
G	Gas fitting dia. ¾"
H	Hot water return dia. 1"¼
L	Renewable source water return dia. 1"¼
M	Renewable source water delivery dia. 1"¼
N	Hot water delivery dia. 1"¼
Q	Safety valve outlet ducting dia. 1"¼

Figure 3.2 – Outdoor unit dimensions



LEGEND

A	Fumes outlet dia 80	F	Appliance on indicator
B	Combustion air intake dia 80	G	Gas fitting dia. ¾"
C	Manual reset fumes thermostat	H	Hot water return dia. 1"¼
D	Power cable input	L	Renewable source water return dia. 1"¼
E	Cooling fan	M	Renewable source water delivery dia. 1"¼
		N	Hot water delivery dia. 1"¼

4 NORMAL OPERATION

In this section you will find all the indications necessary for the activation, regulation and control of operation of the appliance depending on the type of installation and control setup.

- **TYPE A**: controlled by CCP (see Figure 6.4 Comfort Control Panel e Accessory → 48, detail CCP).
- **TYPE B**: controlled by DDC (see Figure 6.3 CCI/DDC → 47).
- **TYPE C**: controlled by consent switch (e.g. on-off switch, ambient thermostat, timer, etc.).

4.1 START UP (AND SHUT DOWN)

Efficient operation and long life of the appliance depend largely on its correct use!

Before activating the appliance, check that:

- the gas valve is open;
- the appliance is powered electrically: the general electrical switch (GS) must be in the «ON» position;
- power supply to the CCP/DDC (if provided) is on;
- the installation technician has ensured that the hydraulic circuit is supplied in the correct conditions.

If these conditions are satisfied, it is possible to proceed with activation.

TYPE A: APPLIANCE CONNECTED TO COMFORT CONTROL PANEL (CCP)

If the appliance is connected to a Comfort Control Panel (see detail CCP in Figure 6.4 Comfort Control Panel e Accessory → 48) it is switched on and controlled by the Comfort Control Panel. In this case, refer to the manual supplied with it.

The appliance must never normally be switched on and off by shutting off the power supply upstream of the Comfort Control Panel before having used the latter first and waited for the shutdown cycle to end (approximately 7 minutes). The shutdown cycle terminates when the hydraulic pump switches off (no parts in motion).

Shutting off the power supply while the appliance is running can cause permanent damages to internal components!

TYPE B: APPLIANCE CONNECTED TO A DIRECT DIGITAL CONTROLLER (DDC)

If the appliance is connected to a Direct Digital Controller (see Figure 6.3 CCI/DDC → 47) and the DDC is in controller mode, activation and control of the appliance will occur exclusively by operating the DDC. In this case, refer to the manual supplied with it.

The appliance must never normally be switched on and off by shutting off the power supply upstream of the DDC before having used the latter first and waited for the shutdown cycle to end (approximately 7 minutes). The shutdown cycle terminates when the hydraulic pump switches off (no parts in motion).

Shutting off the power supply while the appliance is running can cause permanent damages to internal components!

TYPE C: STANDALONE APPLIANCE

Standalone appliances must be activated and deactivated only by means of the consent switch provided by the electrical installation technician.
According to requirements, this consent switch may be an on/off button, an ambient thermostat, a programmable timer, or one or more voltage free contacts controlled by another process. For details about the type of on/off command installed, contact the plant's electrical installation technician.

The appliance must never normally be switched on and off by shutting off the power supply upstream of the Controle Device (CCP, DDC or consent switch) before having used the latter first and waited for the shutdown cycle to end (approximately 7 minutes). The shutdown cycle terminates when the hydraulic pump switches off (no parts in motion).

Shutting off the power supply while the appliance is running can cause permanent damages to internal components!

Start up
Switch on the appliance by means of the on/off command (placing it in the "ON" position).
Shut down
Switch off the appliance via the on/off command (placing it in the "OFF" position).

The shutdown cycle takes approximately 7 minutes to complete.

The on/off command is essential! Do not switch the appliance on or off by connecting it to or disconnecting it from the power supply directly, as this may be a source of danger and in any case damage the appliance or the plants connected to it.

Visualising and clearing of operating codes

Operating codes can be generated:
- by the S61 on-board controller;
- by the CCP/DDC (if present).

The operating codes generated by the S61 controller are displayed on its screen and can also be viewed on the CCI (if present) or DDC (if present).
Operating codes generated by the controller can be cleared through the board itself or from the CCI/DDC (if fitted and allowed).

For a description of the operating codes generated by the electronic board and how to reset them, refer to the list of operating codes contained in Table 9.1 TABLE OF OPERATING CODES generated by the S61 electronic board (firmware version 3.024) → 82.

The controller (see Figure 6.1 Electronic board S61 → 46) is located inside the electrical panel of the appliance and the display may be viewed through the viewing hole on the front panel of the unit itself.

The Machine Codes generated by the CCI/DDC may only be viewed on the display of the CCI/DDC and may be cleared only through the CCI/DDC.

For the operating codes generated by the CCP/DDC, refer to the manuals supplied with the unit.

Operating codes generated by the electronic board during the start-up of the appliance

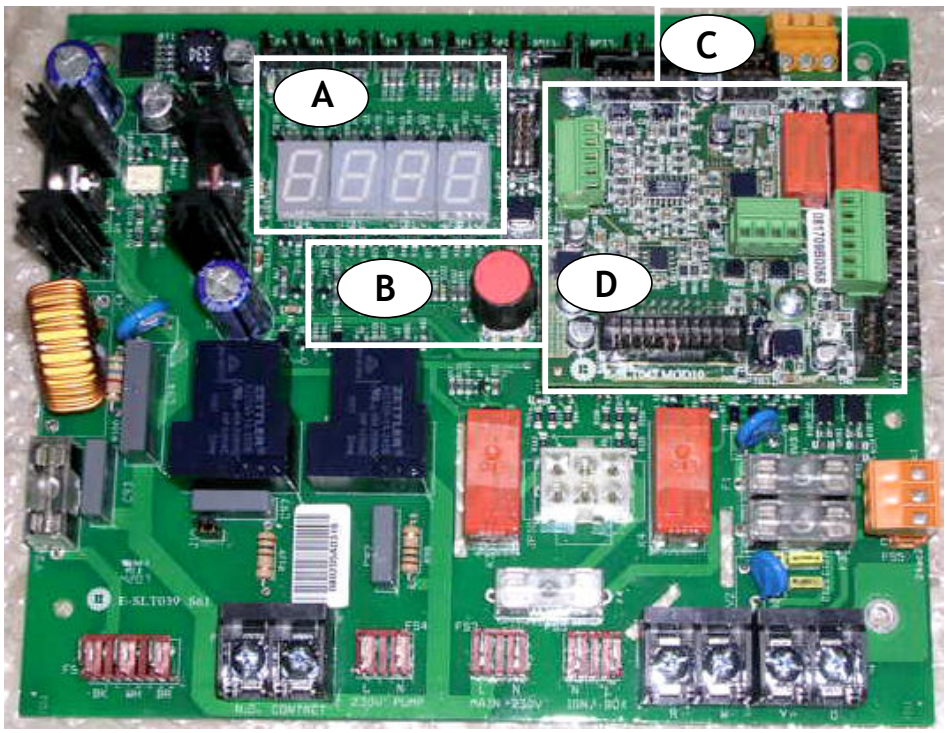
If the appliance remains inactive for a prolonged period, it is possible that air is present in the gas pipes. In this case, activation fails and the appliance reports the operating code: "u_12" - flame controller arrest (temporary) (see Paragraph 9.1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING → 82) and after a brief interval the appliance automatically launches the start up procedure again. If code (u_12) is signalled 3 times on successive activation attempts, the code persists, the appliance locks out the flame controller and displays the following operating code: "E_12" - flame controller arrest (see Paragraph 9.1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING → 82). In this case reset is not automatic.
To restore operation of the appliance, carry out a reset of the flame control unit via menu 2 of the controller: the procedure is illustrated in Paragraph 4.3 RESET OPERATIONS → 22. After it is reset, the appliance will make a new attempt to activate.
If the appliance locks out several times, contact a Robur TAC by calling the *Technical Service Department* of Robur S.p.A. (tel. +39.035.888111).
When activation is successful, the appliance is managed by the on-board controller (see following paragraph).

4.2 ON-BOARD ELECTRONICS

The following descriptions refer to the S61 controller with firmware version 3.024.

The appliance is fitted with an S61 microprocessor controller with Mod10 modulation controller mounted above it (see Figure 4.1 On-board controller → 20).
The S61 controller, in the electrical panel, controls the appliance and displays data, messages and operating codes.
Programming, control and monitoring of the appliance take place by interacting with the display A and knob B shown in Figure 4.1 On-board controller → 20. The CAN-BUS port connects one or several appliances to the CCP (if present) or a DDC (if present).
The Mod10 controller (detail D in Figure 4.1 On-board controller → 20) is used for combustion modulation and variable rate pump control.

Figure 4.1 – On-board controller



LEGEND

A	4 digit display
B	Knob
C	CAN port
D	Mod10 controller

S61 + Mod10

Description of menu of S61 controller

The parameters and settings of the appliance are grouped in the menus shown on the controller's display:

Table 4.1 – Menu of electronic board

MENU	MENU DESCRIPTION	THE DISPLAY SHOWS
Menu 0	VIEW DATA (TEMPERATURE, VOLTAGE, PUMP SPEED, ECC...)	0.
Menu 1	VIEW ALL PARAMETERS	1.
Menu 2	ENTER ACTIONS	2.
Menu 3	USER SETTINGS (THERMOSTATING, SET-POINT, T. DIFFERENTIAL)	3.
Menu 4	INSTALLATION TECHNICIAN SETTINGS	4.
Menu 5	TECHNICAL ASSISTANCE CENTRE SETTINGS	5.
Menu 6	TECHNICAL ASSISTANCE CENTRE SETTINGS (MACHINE TYPE)	6.
Menu 7	VIEW DIGITAL IMPUTS	7.
Menu 8	(MENU NOT USED)	8.
E	EXIT MENU	E.

Menu list of electronic board

Menus 0, 1 and 7 are Viewing Menus: they only allow the information displayed to be read, and not modified. Menu 0 shows the appliance operating data in real time. Menu 1 shows the parameters that characterise the operation of the appliance and their current values.

Menu 7 is to be used ONLY by the Robur TAC.

To view the information contained in these menus, proceed as illustrated in the paragraph "How to acces the menus".
Menu 2 is an execution menu: it allows the operations of resetting the flame control unit, error reset and the manual defrosting command to be performed.
To perform these procedures, see Paragraph 4.3 RESET OPERATIONS → 22.
Menu 3 is a Settings Menu: it allows the values displayed to be set. The correct values of these parameters, for optimum performance of the appliance with the plant to be used

connected, have already been set during installation. To set new values for the parameters, see Paragraph 5.8 PROGRAMMING OF HYDRAULIC PARAMETERS → 42.
Menus 4, 5, 6 and 7 exclusively concern the installation technician and Robur's authorized Technical Assistance Centre.
Menu 8 may currently be selected, but not used.

Display and knob

The controller's display can be viewed through the glass of the viewing aperture on the front panel of the appliance.
Upon activation, all of the LEDs of the display light up for approximately three seconds, and then the name of the board, S61, appears. After around 15 seconds after the appliance powers up, the appliance starts running if the required consent is available.
During correct operation the display shows, alternately, the following information: outlet water temperature, inlet water temperature, and the difference between the two water temperatures (see Table 4.2 Operating information → 21).

Table 4.2 – Operating information

OPERATING MODE: HEATING	
PARAMETER	**THE DISPLAY SHOWS**
Hot outlet water temperature	50.0
Hot inlet water temperature	40.0
Differential Temperature (outlet - inlet)	10.0

Example of data visualised on display: water temperature and differential

If there are operating problems, the display shows, sequentially, the operating codes corresponding to the problem detected. A list of these codes with their description and the procedure to follow to bring the appliance back to correct operation is provided in Paragraph 9.1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING → 82.
The knob is used to display or set parameters, or to execute actions/commands (e.g.: a function or reset), when permitted.

HOW TO ACCESS THE MENUS

- To use the knob with the special key supplied with the appliance:

You will need: the appliance's electrical power switches set to "ON"; the controller's display sequentially shows the operating data (temperature, delta T) regarding the current mode (e.g.: heating) and any active operating codes ("u/E...").

1. Remove the front panel by removing the fixing screws.
2. Remove the cover of the electrical panel to access the knob.
3. Use the special key through the hole to operate the knob and access the controller's menus and parameters.
4. To display the menus just press the knob once: the display shows the first menu: "0." (= menu 0).
5. The display shows "0.". To display the other menus, turn the knob clockwise; The display will read, in order: "1.", "2.", "3.", "4.", "5.", "6.", "7.", "8." and "E" (see Table 4.1 Menu of electronic board → 20).
6. To display the parameters in a given menu (for example, menu 0), turn the knob until it displays the menu in question (in the example: "0.") and press the knob: the display will show the first of the menu's parameters, in this example "0.0" or "0.40" (= menu 0, parameter "0" or "40").

7. In the same way: **turn** the knob to scroll through content (menus, parameters, actions), **press** the knob to select/confirm the content (access a menu, display/set a parameter, execute an action, quit or return to the previous level). For example, to quit the menus, turn the knob to scroll through menus "0.", "1.", "2." etc. until the controller displays the quit screen "E"; now press the knob to quit.

In the case of menus 0 and 1, the user can view any parameter. For information about menu 2, refer to Paragraph 4.3 RESET OPERATIONS → 22. To set the parameters of menu 3, refer to Paragraph 5.8 PROGRAMMING OF HYDRAULIC PARAMETERS → 42. The other menus are not for the User: the information in these menus is dealt with in the sections dedicated to the installation technician or Robur TAC.

The special key allows the knob of the electronic board to be operated without opening the cover of the electrical panel, so that operators are protected from live components. When the necessary settings have been completed, put away the special key, replace the cap on the aperture of the electrical panel and refit the front panel of the appliance.

4.3 RESET OPERATIONS

There are several possible reasons why the appliance may have error status and therefore its operation arrested; such an error situation does not necessarily correspond to damage or malfunction on the part of the appliance. The cause that has generated the error may be temporary: for example, presence of air in the gas supply line or temporary power failure.
The appliance can be reset with controller menu 2, the Comfort Control Panel (if present) or the DDC (if present). In these two latter cases, refer to their documentation.

Reset appliance controller

The Table 4.3 Menu 2 → 22 shows the actions available in menu 2.

For regulatory reasons, the flame controller reset is in a dedicated voice of menu.

Table 4.3 – Menu 2

ACTION	REQUIRED FOR EXECUTION	SHOWN ON DISPLAY AS
0	Reset flame controller arrest	2. 0
1	Reset other operating codes	2. 1
3	Timed forcing to minimum power	2. 3
4	Timed forcing to maximum power	2. 4
5	Regulation of power	2. 5
E	(EXIT MENU)	2. E

The general operating codes of the unit's controller can be reset with actions "0" and "1". Actions "3", "4" and "5" are used to regulate the combustion parameters or for gas type changeovers, and are thus for use only by the installation technician or Robur TAC (for other information refer to Paragraph 7.1 PROCEDURE FOR FIRST START UP → 73).

RESET FLAME CONTROLLER (ACTION "0"):

Reset flame controller arrest; this may be used when the appliance is first activated, see Paragraph 4.1 START UP (AND SHUT DOWN) → 17, when the appliance is in a permanent locked condition or after a long period of disuse (see Paragraph 4.5 PROLONGED PERIODS OF DISUSE → 24).

You will need: access to the electrical panel, see Paragraph "Display and knob".

To reset the flame control unit select menu 2, as indicated in the Paragraph "Accessing the Menus"; then proceed as follows:

1. The display shows: "2." press the knob to access the menu. The display initially shows item "2. 0".
2. Press the knob to display the flashing reset request: "reS1".
3. Press the knob again to reset the flame controller. The reset request stops flashing, and again the display shows "2. 0". The reset operation has been performed.
4. To quit the menu, turn the knob clockwise until the "2. E" is displayed. Now press the knob to return to menu selection: "2.".
5. To exit the menu selection and return to the normal visualisation of the parameters of the appliance, turn the knob clockwise until "E" displays; press the knob to quit.

At this point, if the display does not signal any other operating codes, put away the special key, replace the electrical panel cover and refit the front panel.

RESET OTHER OPERATING CODES (ACTION "1"):
Reset other appliance errors; this is required to reset any errors which may occur during operation.

You will need: access to the electrical panel, see Paragraph "Display and knob".

To reset the controller errors, select menu 2, as indicated in the Paragraph "Accessing the Menus"; Then:

1. The display shows: "2." press the knob to access the menu. The display initially shows item "2. 0".
2. Turn the knob clockwise to display item "2. 1".
3. Press the knob to display the flashing reset request: "rEr1".
4. Press the knob again to perform a board error reset. The reset request stops flashing, and the again display shows "2. 1". The reset operation has been performed.
5. To quit the menu, turn the knob clockwise until the "2. E" is displayed. Now press the knob to return to menu selection: "2.".
6. To exit the menu selection and return to the normal visualisation of the parameters of the appliance, turn the knob clockwise until "E" displays; press the knob to quit.

At this point, if the display does not signal any other operating codes, put away the special key, replace the electrical panel cover and refit the front panel.

4.4 OPERATING SETTINGS

The operations described require basic knowledge of the plant installed and of the S61 controller fitted to the appliance; before proceeding, you must acquire this information, Paragraph 4.2 ON-BOARD ELECTRONICS → 19.

At the moment of installation, the appliance is set up by the installation technician for best operation according to the type of plant installed. Subsequently it is possible to modify the operating parameters, but this is not recommended if not in possession of the necessary knowledge and experience in order to do so. In any case, to set new operating parameters for the appliance see Paragraph 5.8 PROGRAMMING OF HYDRAULIC PARAMETERS → 42.

4.5 PROLONGED PERIODS OF DISUSE

When the appliance is to be inactive for a long period, it is necessary to disconnect the appliance before the period of disuse and reconnect it before it is used again.
To carry out these operations, contact a reputable hydraulic system installation technician.

Disconnecting the appliance

You will need: the appliance connected to the power/gas supply. Necessary equipment and materials.

1. If the appliance is in operation, switch it off with the CCP (if present) or DDC (if present), or the consent switch and wait for the shutdown cycle to terminate completely (approximately 7 minutes).
2. Disconnect the appliance from the power supply, putting the external disconnection switch in the OFF position (see GS in Figure 6.6 Electrical wiring diagram → 50) provided in the appropriate panel by the installation technician.
3. Close the gas valve.

Do not leave the appliance connected to power and gas supply if it is expected to remain inactive for a long period.

If you wish to disconnect the appliance during the winter, one of the following two conditions must be met:

1. make sure that the hydraulic plant connected to the appliance contains an adequate percentage of glycol antifreeze (see Paragraph 5.6 FILLING OF HYDRAULIC CIRCUIT → 34 and Table 5.3 Technical data for filling the hydraulic circuit → 36);
2. activate the antifreeze function, which runs the circulation pumps and the appliance when water temperature is below 4°C or in case the outdoor temperature is lower than 2 °C. To do this, contact your installer. This function requires the appliance to be ALWAYS powered up (electricity and gas) and power failures excluded. **Otherwise the manufacturer declines all contractual and extra-contractual liability for consequent damage.**

Connecting the appliance before it is used again (to be carried out by the installer)

Before starting this procedure, the hydraulic system installation technician must:

- ascertain whether the appliance requires any maintenance operations (contact your authorised Robur Technical Assistance Centre or consult Paragraph 7.2 MAINTENANCE → 77);
- check that the water content of the plant is correct; if necessary, top up the circuit to at least the minimum quantity (see Paragraph 5.6 FILLING OF HYDRAULIC CIRCUIT → 34);
- if necessary add, to the water of the system (free of impurities), inhibited monoethylene glycol antifreeze in a quantity in proportion to the MINIMUM winter temperature in the area of installation (see Table 5.3 Technical data for filling the hydraulic circuit → 36);
- bring the plant to the correct pressure, making sure that the pressure of the water in the plant is not less than 1 bar and not over 2 bar;

In case of winter saesonal switch-off or long period of stopping, we suggest to not empty the hydraulic circuit: in that case possible oxidation process can occur.This oxidation process could damage both the hydraulic system and also the Robur heat pump.It's important to verify that no leakages occur in the hydraulic circuit that may empty part of the system. The above recommendation is necessary in order to avoid to fill continuously with water that may imply the additional introduction of oxygen and the consequent dilution of the used inhibitor, for ex glycol. In case of precence of glycol, Robur advices to use inhibited glycol. Galvanized pipes are not recommended, as they are not compatible with glycol.

You will need: the appliance disconnected from the electricity/gas supply

1. open the plant gas supply valve to the appliance and make sure that there is no smell of gas (indicating possible leaks);

   if you smell gas, close the gas valve again immediately without operating any other electrical device and, from a safe place, request the assistance of professionally qualified personnel.

2. If no smell of gas is detected, connect the appliance to the electricity supply mains via the external circuit breaker provided by the installation technician in the appropriate panel (set the "GS" circuit breaker to the "ON" position, see Figure 6.6 Electrical wiring diagram → 50);
3. power up the CCP (if present) or DDC (if present);
4. check that the hydraulic circuit is charged;
5. check that the condensate siphon is NOT empty or blocked (see Paragraph 5.5 CONDENSATE DISCHARGE → 31);
6. check that inlet/outlet ducts are correctly connected and NOT obstructed.
7. switch on the appliance by means of the on/off command (or DDC if present and in control mode, or via CCP, if present).

5 HYDRAULIC INSTALLATION

In this section you will find all the instructions necessary for installing the appliance from a hydraulic viewpoint. The hydraulic system installation technician must consult the electrical system installation technician in order to decide upon the correct sequence of the operations to be carried out.

Before realizing hydraulic system and gas supply for the appliance, the professionally qualified personnel is advised to read Paragraph 3.1 GENERAL INFORMATION → 8, providing important recommendations about safety and references to current regulations.

5.1 GENERAL INSTALLATION PRINCIPLES

Prior to installation, carry out careful internal cleaning of all pipes and every other component to be used both on the hydraulic system and on the fuel supply, in order to remove any debris that may compromise the operation of the appliance.

Installation of the appliance must be carried out in compliance with current regulations regarding design, installation and maintenance of heating and cooling plants and must be undertaken by professionally qualified personnel in accordance with the manufacturer's instructions.
During the installation stage, observe the following indications:

- Check that there is an adequate mains gas supply, in accordance with the manufacturer's specifications; see Table 5.2 Network gas pressure → 31 for the correct supply pressures.
- The appliance must be installed inside the building in a suitable room (see EN378). The machine room must be protected from freezing.
- **The appliance is not designed for outdoors installation. The appliance must not be exposed to rain and must be installed in a ventilated location in line with the safety and installation standards applicable to this type of device.**
- ONLY the outdoor version (see Figure 3.2 Outdoor unit dimensions → 16) can be installed outdoor and does not need any specific protection against the weather and against freezing.
- The front of the appliance must be at least 80 cm away from walls or other fixed constructions; the right and left sides must have a minimum clearance of 45 cm; the minimum rear clearance from walls is 20 cm (see Figure 5.2 Clearances → 28).
- The appliance must be installed in such a way that the exhaust flue gas outlet is not in proximity of any external air inlet of a building. Respect current regulations regarding the exhaust flue gas outlet.
- Fit a gas cock on the gas supply line.
- Fit antivibration joints on the hydraulic connections.

5.2 POSITION OF THE APPLIANCE

Lifting the appliance and placing it in position
Do not remove packaging during handling on the installation site.

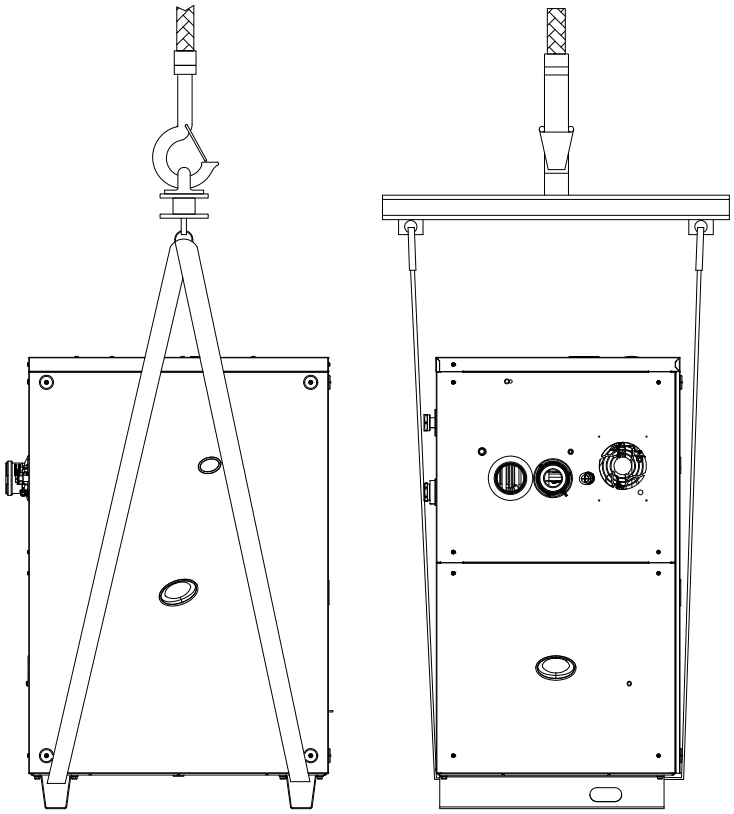
Packing must only be removed upon final installation.

If the appliance has to be lifted, pass slings into the openings in the base supports and use spreader bars to prevent the slings from damaging the casing during handling (see Figure 5.1 Lift GS/WS → 27).

The lifting crane and all accessory devices (braces, cables, bars) must be suitable sized for the load to be lifted. For the weight of the appliance, consult Table 3.1 GS HT/LT technical data → 12 and Table 3.2 WS technical data → 13.

The manufacturer cannot be held responsible for any damage occurring during the installation of the appliance.

Figure 5.1 – Lift GS/WS



MOUNTING BASE

Always place the appliance on a levelled flat surface made of fireproof material and able to support the weight of the appliance.

If a horizontal support base is unavailable (see also "SUPPORTS and LEVELLING" below), it is necessary to create a flat level base in concrete which is larger than the dimensions of the base of the appliance by at least 100-150 mm on each side.

The dimensions and weight of the appliance are given in Table 3.1 GS HT/LT technical data → 12 and in Table 3.2 WS technical data → 13.

Although the appliance produces only moderate vibrations, the use of anti-vibration supports (available as accessories, see SECTION 8 ACCESSORIES → 81) is especially recommended in cases in which resonance phenomena may occur.

Moreover, it is advisable to use flexible connections (anti-vibration joints) between the appliance and the hydraulic and gas supply pipes.

SUPPORTS AND LEVELLING

The appliance must be correctly levelled by placing a spirit level on the upper part.

If necessary, level the appliance with metal shimming; do not use wooden spacers as these deteriorate quickly.

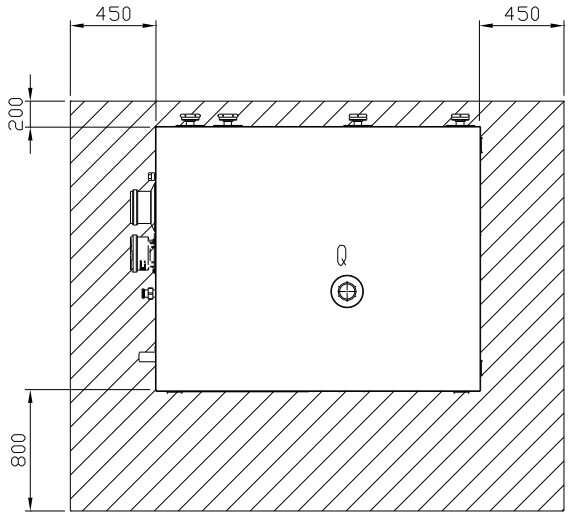
CLEARANCES AND WARNINGS

Position the appliance so as to maintain **minimum clearances** from combustible surfaces, walls or other appliances, as illustrated in Figure 5.2 Clearances → 28.

Minimum clearances are necessary in order to be able to carry out maintenance operations.

The fumes outlet terminals must be installed in such a way that they do not allow the fumes to collect or return to the circuit in the unit's installation area. The outlet terminal must be constructed in conformity with established regulations.

Figure 5.2 – Clearances



Place the appliance preferably far from environments where silence is required, such as bedrooms, meeting rooms, etc.
Evaluate the noise impact of the appliance in consideration of the installation site: avoid installing the appliance in positions that could amplify its running noise (reverb effect).

5.3 HYDRAULIC CONNECTIONS

General indications

- The hydraulic installation may be realized using pipes in stainless steel, black steel, copper or crosslinked polyethylene for heating/cooling applications. All water pipes and pipe connections must be properly insulated in compliance with current regulations to prevent heat losses and outer condensation.
- To prevent icing in the primary circuit during winter time, the appliance is provided with antifreeze functions activating the water circulation pump of the primary circuit (if controlled by the appliance) and the burner of the appliance itself (when necessary). It is therefore necessary to ensure a permanent supply of electricity and gas to the appliance throughout the whole winter period. If it is not possible to ensure a permanent supply of electricity and gas to the appliance, use glycol antifreeze of the inhibited monoethylene type.
- If glycol antifreeze is to be used (see Paragraph 5.6 FILLING OF HYDRAULIC CIRCUIT → 34), DO NOT USE galvanised pipes, as they are potentially subject to corrosion phenomena in the presence of glycol.
- If using rigid pipes, use vibration damping couplings at the water and gas connections on the appliance's service plate to prevent vibration.

As other hydronic appliances, Robur heating and cooling systems operate with grid-water of good quality. In order to prevent any possible problem of operation or reliability caused by filling or top-up water, please refer to codes and norms about water treatment for thermo-hydraulic installations in civil or industrial applications. Parameters indicated in Table 5.1 Chemical and physical parameters of water → 29 must be complied with.

Table 5.1 – Chemical and physical parameters of water

CHEMICAL AND PHYSICAL PARAMETERS OF WATER IN HEATING/COOLING SYSTEMS		
PARAMETER	**UNIT OF MEASUREMENT**	**ALLOWABLE RANGE**
pH	\	>7 (1)
Chlorides	mg/l	< 125 (2)
Total hardness ($CaCO_3$)	°f	< 15
	°d	< 8,4
Iron	mg/kg	< 0,5 (3)
Copper	mg/kg	< 0,1 (3)
Aluminium	mg/l	< 1
Langelier's index	\	0-0,4
HARMFUL SUBSTANCES		
Free chlorine	mg/l	< 0,2 (3)
Fluorides	mg/l	< 1
Sulphides		ABSENT

1 with aluminium or light alloys radiators, pH must also be lower than 8 (in compliance with applicable rules)
2 value referred to the maximum water temperature of 80 °C
3 in compliance with applicable rules

Water quality can be measured through parameters like acidity, hardness, conductivity, chlorides content, chlorine content, iron content and the like.

The presence of free chlorine in the water, in particular, can jeopardize parts of the installation and Robur units. Therefore, please make sure that free chlorine content and total hardness are compliant with the allowable ranges reported in Table 5.1 Chemical and physical parameters of water → 29.

The way the installation is operated can be the cause of possible degradation of water quality.
Moreover, abnormally massive water top-up or reintegration can cause a drift of chemical or physical above-mentioned parameters. Reintegration should not exceed 5% per year of the total amount of water. It is advised to check regularly the water quality, especially in case of automatic or periodic top-up.
In case water treatment is needed, this operation should be carried out by a professional or competent person, following strictly the instructions by the manufacturer or supplier of the chemical substances for the treatment, since dangers could arise for health, for the environment and for Robur appliances.
Several products for water treatment are available on the market.
Robur does not perform detailed market surveys. Therefore Robur suggests to contact Companies which are specialized in water treatments. They will be able to suggest the best way how to proceed according to the type of installation.
In case washing of the pipes is needed, this operation should be carried out by a professional or competent person, following strictly the instructions by the manufacturer or supplier of the chemical substances for the washing, avoiding the use of substances aggressive for stainless steel or containing/releasing free chlorine.
Please make sure the pipes are properly rinsed in order to remove any residue of chemical substances from the pipes.
Robur is not liable for ensuring that water quality is always compliant with what reported in Table 5.1 Chemical and physical parameters of water → 29. Non-compliance with indications above may jeopardize the proper operation, integrity and reliability of Robur appliances, invalidating the warranty.
For any further detail, please contact directly Robur S.p.A. (tel.+39 035.888.111).
The components below are always to be fitted in proximity to the appliance:

- FLEXIBLE JOINTS on water and gas connections of the appliance.
- PRESSURE GAGES on the inlet and outlet water pipes.

- FLOW REGULATION VALVE on the water inlet pipe (only if the appliance is controlled by a CCP/DDC).
- WATER FILTER installed on the water inlet pipe.
- ISOLATION BALL VALVE on the water and gas pipes of the installation.
- 3 BAR SAFETY VALVE installed on the outlet water pipe.
- PLANT EXPANSION TANK installed in the appliance outlet water pipe.
- EXPANSION TANK for the individual appliance, installed on the water outlet pipe (primary side). Provide a plant expansion tank in any case (secondary side), installed in the water outlet pipe.

The appliance is not equipped with an expansion tank; therefore it is necessary to install a suitable expansion tank, sized for the maximum temperature range and maximum operating water pressure of the plant.

- variable rate WATER CIRCULATION PUMP, FOR PLANT WITH A SINGLE APPLIANCE, located on the water inlet pipe of the appliance, flowing towards the appliance.
- variable rate WATER CIRCULATION PUMP, FOR PLANT WITH A SEVERAL APPLIANCES (each appliance have is pump), flowing towards the appliance.
- PLANT FILLING SYSTEM: if automatic filling systems are used, a seasonal check of the percentage of monoethylene glycol in the plant is recommended.

For other components to be installed in the system, refer to "Design Manual". For further information or technical support in this regard, contact Robur S.p.A.'s Presales Office (tel.+39 035.888.111) or visite site www.robur.it.

The operations necessary for the First Activation or Regulation of the appliance must be carried out exclusively by an authorised Robur Technical Assistance Centre (TAC). These operations are described in Section 7 INITIAL ACTIVATION AND MAINTENANCE → 73.

The products' guarantee is void if initial activation is not carried out by a Robur TAC.

5.4 GAS SUPPLY

The installation of gas supply pipes must be compliant with current regulations and norms.
The gas supply pressure must be in the range given in Table 5.2 Network gas pressure → 31.

Supplying gas to the appliance at pressures higher than those indicated above can damage the gas valve, resulting in dangerous situations.

LPG systems must be equipped with a first stage pressure reducer close to the LPG storage tank, in order to reduce the gas pressure to 1,5 bar, and a second stage pressure reducer, close to the unit, in order to reduce pression from 1,5 bar to the value in agreement with the gas network pressure of the country of installation (see Table 5.2 Network gas pressure → 31).

Exemple for the Italian market: for the G30 gas, from 1,5 bar to 0,030 bar (30mbar); for the G31 gas, from 1,5 bar to 0,037 bar (37mbar).

LPG may cause corrosion; piping and fitting materials must be resistant to this corrosion.

Vertical gas pipes must be equipped with a siphon and provided with a drain for the condensate that may form inside the pipe during cold periods. It may also be necessary to insulate the gas pipe to prevent the formation of excessive condensate.

In any case, provide an isolation valve (ball valve) on the gas supply line, to isolate the appliance when required.

Table 5.2 – Network gas pressure

E3-GS; E3-WS; E3-A; GAHP-GS; GAHP-WS; GAHP-A		Gas supply pressure						
Product categories	**Countries of destination**	**G20** [mbar]	**G25** [mbar]	**G30** [mbar]	**G31** [mbar]	**G25.1** [mbar]	**G27** [mbar]	**G2,350** [mbar]
$II_{2H3B/P}$	AL, BG, CY, CZ, DK, EE, FI, GR, HR, IT, LT, MK, NO, RO, SE, SI, SK, TR	20		30	30			
	AT, CH	20		50	50			
II_{2H3P}	AL, BG, CZ, ES, GB, HR, IE, IT, LT, MK, PT, SI, SK, TR	20			37			
	RO	20			30			
$II_{2ELL3B/P}$	DE	20	20	50	50			
II_{2Esi3P}	FR	20	25		37			
$II_{2HS3B/P}$	HU	25		30	30	25		
II_{2E3P}	LU	20			50			
$II_{2L3B/P}$	NL		25	50	50			
$II_{2E3B/P}$	PL	20		37	37			
$II_{2ELwLs3B/P}$		20		37	37		20	13
$II_{2ELwLs3P}$		20			37		20	13
$I_{2E(R)B}$; I_{3P}	BE	20	25		37			
I_{3P}	IS				30			
I_{2H}	LV	20						
$I_{3B/P}$	MT			30	30			
I_{3B}				30				

For data regarding hourly fuel consumption of the appliance, refer to Tables 3.1 GS HT/LT technical data → 12 and 3.2 WS technical data → 13.

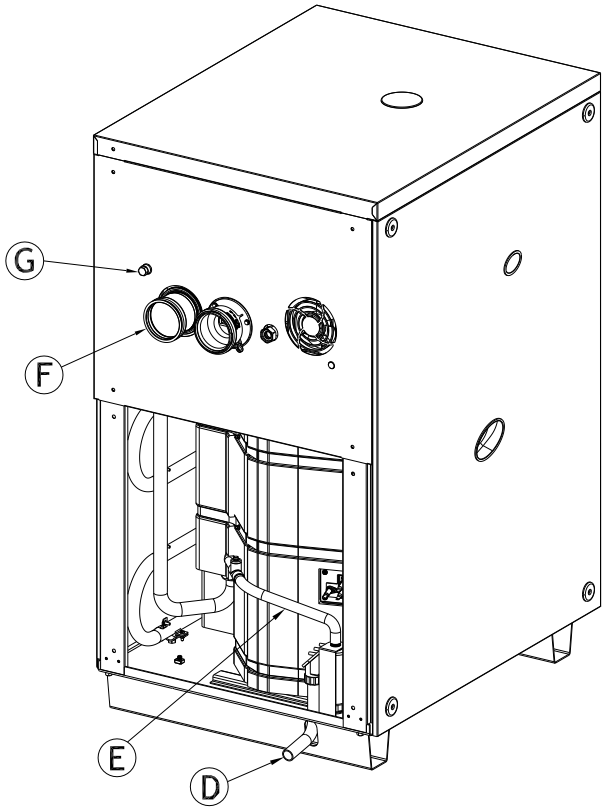
5.5 CONDENSATE DISCHARGE

INDOORS UNITS

The fumes condensate outlet is on the left of the appliance.
The appliance is equipped with a siphon with a piece of pipe connected.
If you wish to use the pipe supplied with the unit, proceed as follows:

1. Connect the pipe to a plastic discharge manifold of the proper length.
2. The connection between the pipe and the manifold must remain visible.

Figure 5.3 – Position of condensate discharge and manual reset fumes thermostat



LEGEND

D	Condensate discharge
E	Hose connecting to condensate siphon
F	Fumes outlet
G	Fumes thermostat manual reset

Position of condensate discharge and manual reset fumes thermostat

The condensate discharge to the sewer must be:

- sized so as to discharge the maximum condensation flow (see Table 3.1 GS HT/LT technical data → 12 and Table 3.2 WS technical data → 13 under the respective heading);
- made of materials resistant to acidity with pH 3 to 5;
- sized to ensure a slope of 10 mm per metre of length; if this slope cannot be achieved, a condensate pump must be installed near to the discharge;
- realized in such a way as to prevent icing of the condensate;
- mixed, for example, with domestic effluents (washing machine, dishwasher, etc.), usually alkaline, acting as a buffer solution before discharging into the sewer.

Do not discharge the condensate into the guttering, since it may ice and corrode the materials normally used for gutters.

CHARGING THE SIPHON

To charge the siphon, proceed as follows:

1. Connect the condensate discharge pipe to a drain.
2. Remove the bottom left side panel to access the siphon.
3. **If no fumes exhaust equipment has been installed**: pour 0.2 litres of water directly into the plastic pipe (detail F in Figure 5.3 Position of condensate discharge and manual reset fumes thermostat → 32 and check that it is full. Then proceed to point 6.
4. **If the fumes exhaust equipment has already been installed**: remove the clamp securing the plastic pipe E to the siphon (see Figure 5.3 Position of condensate discharge and manual reset fumes thermostat → 32), disconnect the plastic pipe E from the siphon and fill it with 0.2 litres of water.

5. Reconnect the plastic pipe E and secure it with its clamp.
6. Fit the bottom left side panel.

If the appliance is operated with the siphon empty, there is a risk of leaks of exhaust flue gas.

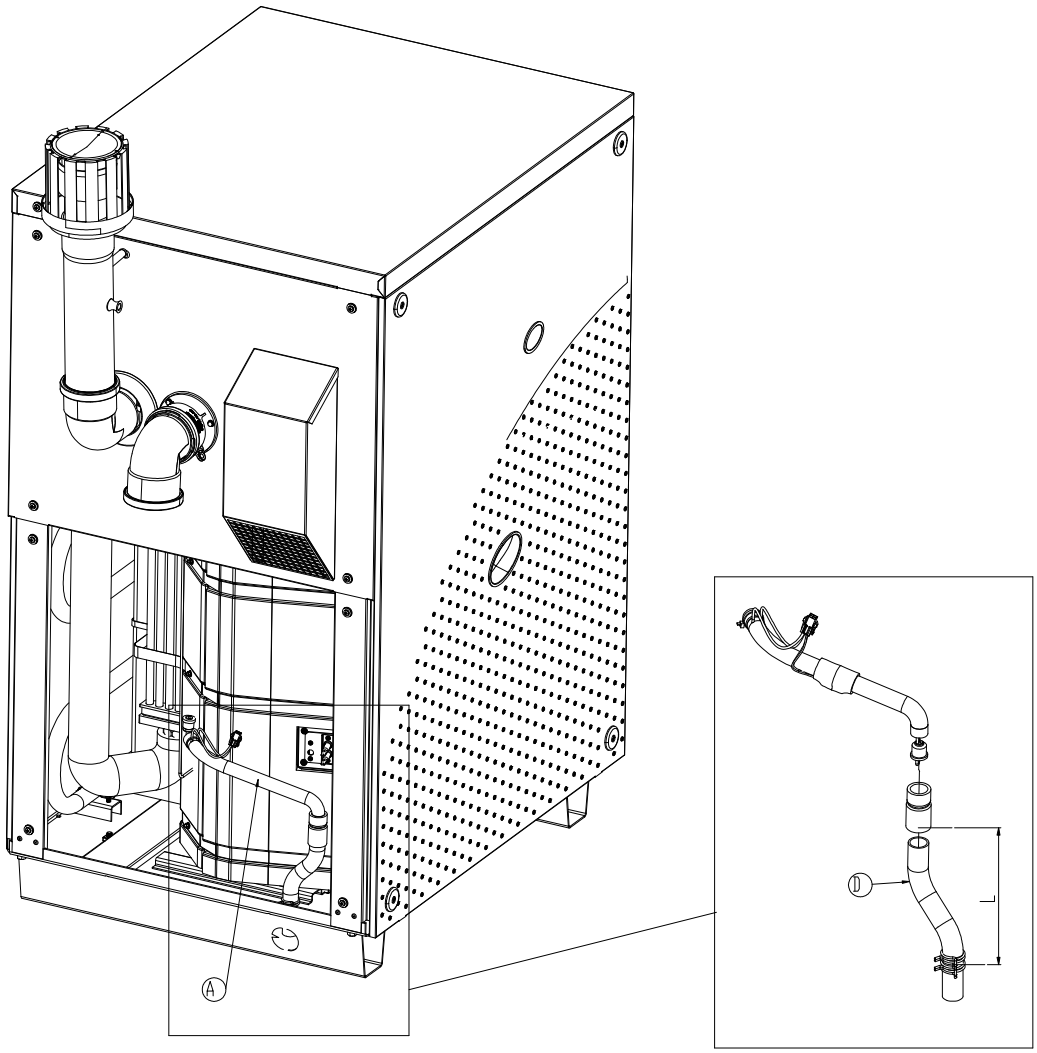
OUTDOORS UNITS

The fumes condensate outlet is on the left of the appliance.

The distance L between the coupling and the base may not exceed 110 mm.

1. The condensate discharge corrugated pipe, coming out from the side of the underbase left support, must be connected to a proper discharge header.
2. The connection between the pipe and the manifold must remain visible.

Figure 5.4 – Position of condensate discharge outdoors units



LEGEND

A Condensate discharge hose

D Corrugated hose

Position of condensate discharge outdoors units

The condensate discharge to the sewer must be:

- sized so as to discharge the maximum condensation flow (see Table 3.1 GS HT/LT technical data → 12 and Table 3.2 WS technical data → 13 under the respective heading);
- made of materials resistant to acidity with pH 3 to 5;

- sized to ensure a slope of 10 mm per metre of length; if this slope cannot be achieved, a condensate pump must be installed near to the discharge;
- realized in such a way as to prevent icing of the condensate;
- mixed, for example, with domestic effluents (washing machine, dishwasher, etc.), usually alkaline, acting as a buffer solution before discharging into the sewer.

Do not discharge the condensate into the guttering, since it may ice and corrode the materials normally used for gutters.

5.6 FILLING OF HYDRAULIC CIRCUIT

After having completed all hydraulic, gas and electrical connections, the installer can proceed filling the hydraulic circuit, observing the following steps:

You will need: the appliance connected hydraulically and electrically.

COLD CIRCUIT GAHP-GS

1. Check that the system delivery and return are correctly connected to the appliance's respective fittings (see Figure 3.1 Size → 15).
2. Activate the automatic air purging valves of the plant and open all thermostatic valves.
3. Fill the hydraulic circuit to at least the minimum amount and add inhibited monoethylene glycol to a volume percentage of 25% (**obligatory minimum required for correct system operation**) or greater depending on the minimum winter temperature in the installation area (see Table 5.3 Technical data for filling the hydraulic circuit → 36). Robur recommends using inhibited corrosion resistant monoethylene glycol.
4. Check the filter on the return pipe for impurities; clean it if necessary.
5. Check that the siphon on the drainage condenses has been filled with water as indicated in the relative paragraph.
6. Bring the plant to the correct pressure, making sure that the water pressure is not less than 1 bar and not over 2 bar, and run the circulation pump for at least 30 minutes. Check the water filter again and clean it if necessary.

The technical data (Tables 3.1 GS HT/LT technical data → 12 and 3.2 WS technical data → 13) regarding the cold circuit refer to water with 25% glycol content, so that no correction factor need to be applied to Table 5.3 Technical data for filling the hydraulic circuit → 36.

To facilitate the operation of bleeding air from the hydraulic circuit, the appliance is equipped with an additional manual air bleeding valve.

COLD CIRCUIT GAHP-WS

1. Check that the system delivery and return are correctly connected to the appliance's respective fittings (see Figure 3.1 Size → 15).
2. Activate the automatic air purging valves of the plant and open all thermostatic valves.

3. Fill the hydraulic circuit to at least the minimum amount and add inhibited monoethylene glycol to a volume percentage in proportion to the minimum winter temperature in the installation area (see Table 5.3 Technical data for filling the hydraulic circuit → 36). Robur recommends using inhibited corrosion resistant monoethylene glycol.

Glycol antifreeze may not be used on condition that the antifreeze function, which runs the circulation pumps, is activated at the CCI/DDC. This function requires the appliance to be ALWAYS powered up (electricity and gas) and power failures excluded, **otherwise the manufacturer declines all contractual and extra-contractual liability for consequent damage.**

4. Check the filter on the return pipe for impurities; clean it if necessary.
5. Bring the plant to the correct pressure, making sure that the water pressure is not less than 1 bar and not over 2 bar, and run the circulation pump for at least 30 minutes. Check the water filter again and clean it if necessary.

The technical data (Tables 3.1 GS HT/LT technical data → 12 and 3.2 WS technical data → 13) regarding the cold circuit refer to water with 25% glycol content, so that no correction factor need to be applied to Table 5.3 Technical data for filling the hydraulic circuit → 36.

To facilitate the operation of bleeding air from the hydraulic circuit, the appliance is equipped with an additional manual air bleeding valve.

HOT CIRCUIT (Heating, sanitary hot water)

1. Check that the system delivery and return are correctly connected to the appliance's respective fittings (see Figure 3.1 Size → 15).
2. Activate the automatic air purging valves of the plant and open all thermostatic valves.
3. Fill the hydraulic circuit to at least the minimum amount and add inhibited monoethylene glycol to a volume percentage in proportion to the minimum winter temperature in the installation area (see Table 5.3 Technical data for filling the hydraulic circuit → 36). Robur recommends using inhibited corrosion resistant monoethylene glycol.

Glycol antifreeze may not be used on condition that the antifreeze function, which runs the circulation pumps and the appliance, is activated at the CCI/DDC. This function requires the appliance to be ALWAYS powered up (electricity and gas) and power failures excluded, **otherwise the manufacturer declines all contractual and extra-contractual liability for consequent damage.**

4. Check the filter on the return pipe for impurities; clean it if necessary.
5. Check that the siphon on the condensate discharge has been filled with water as indicated in Paragraph 5.5 CONDENSATE DISCHARGE → 31 under "Loading the siphon".
6. Bring the plant to the correct pressure, making sure that the pressure of the water in the plant is not less than 1 bar and not over 2 bar, and run the circulation pump for at least 30 minutes. Check the water filter again and clean it if necessary.

To facilitate the operation of bleeding air from the hydraulic circuit, the appliance is equipped with an additional manual air bleeding valve.

Use of glycol antifreeze

Glycols, normally used to lower the freezing point of water, are substances in an intermediate state of oxidation which, in the presence of oxidising agents such as oxygen, are transformed into corresponding acids. This transformation into acids increases the corrosive nature of the fluid contained in the circuit. For this reason, mixtures that are commercially available almost always contain inhibiting substances that are able to control the pH of the solution. A condition necessary for the oxidation and degradation of glycol is the presence of an oxidising agent such as oxygen. In closed circuits in which no replenishment of water (and therefore of oxygen) occurs over time, once the oxygen initially present has reacted, the degenerative phenomenon of glycol is hugely inhibited.
Most circuits, however, are of the non-sealed type, and therefore receive a more or less continuous supply of oxygen.
Therefore it is essential, whatever type of glycol is in question, to verify that it is adequately inhibited and that the necessary checks are regularly performed during its entire period of use.

Antifreeze liquids for cars, which do not contain inhibiting components other than ethylene glycol, are not recommended for cooling and heating plants.

The manufacturer does not accept any contractual or extra-contractual liability for damages caused by the use or disposal of glycol antifreeze.

It is equally important to recall that the use of monoethylene glycol modifies the thermophysical characteristics of the water in the plant, and in particular its density, viscosity and average specific heat. Always check the date of expiry and/or degradation of the product with the supplier.

The technical data (Tables 3.1 GS HT/LT technical data → 12 and 3.2 WS technical data → 13) regarding the hot circuit refer to non-glycolised water, so that the correction factors of Table 5.3 Technical data for filling the hydraulic circuit → 36 must be applied to obtain the consequent increased load drop of the system and penalisation of unit efficiency in relation to the percentage of monoethylene glycol used.

Table 5.3 Technical data for filling the hydraulic circuit → 36 should be taken into account for the sizing of the pipes and the circulation pump (for calculation of internal pressure drops of the appliance, refer to Tables 3.1 GS HT/LT technical data → 12 and 3.2 WS technical data → 13).
Nevertheless, it is advisable to consult the technical specifications of the monoethylene glycol used. If automatic loading systems are used, a seasonal check of the quantity of glycol present in the plant is also necessary.

Table 5.3 – Technical data for filling the hydraulic circuit

% of MONOETHYLENE GLYCOL	10	15	20	25	30	35	40
WATER-GLYCOL MIXTURE FREEZING TEMPERATURE	-3°C	-5°C	-8°C	-12°C	-15°C	-20°C	-25°C
PERCENTAGE OF INCREASE IN PRESSURE DROPS	--	6%	8%	10%	12%	14%	16%
LOSS OF EFFICIENCY OF UNIT	--	0,5%	1%	2%	2,5%	3%	4%

If the percentage of glycol is ≥ 30% (for ethylene glycol) or ≥ 20% (for propylene glycol):

- then parameter 182 in menu 4 must be set to "1" (at the installer's care).

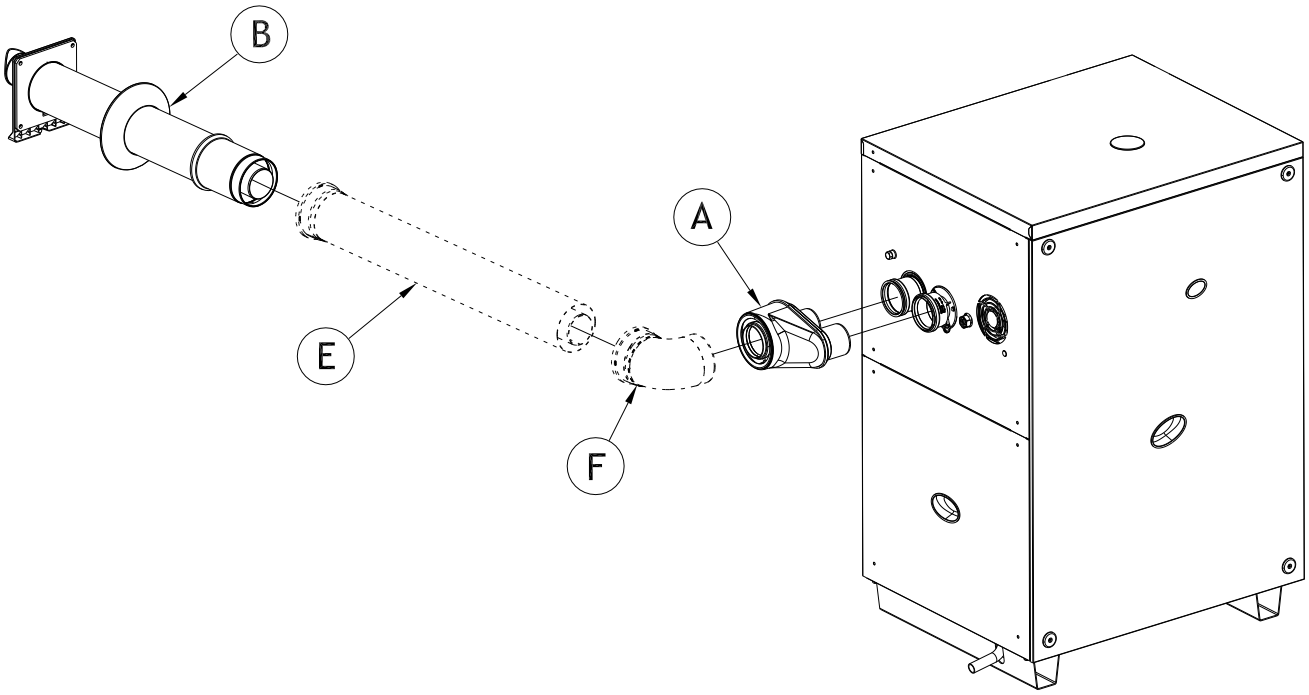
5.7 EXHAUST FLUE GAS

The appliance is homologated for configuration as a type C and B installation. The following installations are possible: C13, C33, C43, C53, C63, C83, B23P and B33.
The appliance is supplied in configuration C63.
We list below the various types of installation and the necessary accessories.

For the sizing of the fumes exhaust pipe and the combustion air pipe, refer to Table 5.9 Fumes temperature and flow → 41.

In case of installation of more than one unit GS/WS connected to one flue pipe, it's necessary to insert one clapet valve for each installed unit, in order to avoid the reflux of the flue through the unit that is not working.

Figure 5.5 – C13 type installation



LEGEND
See table below

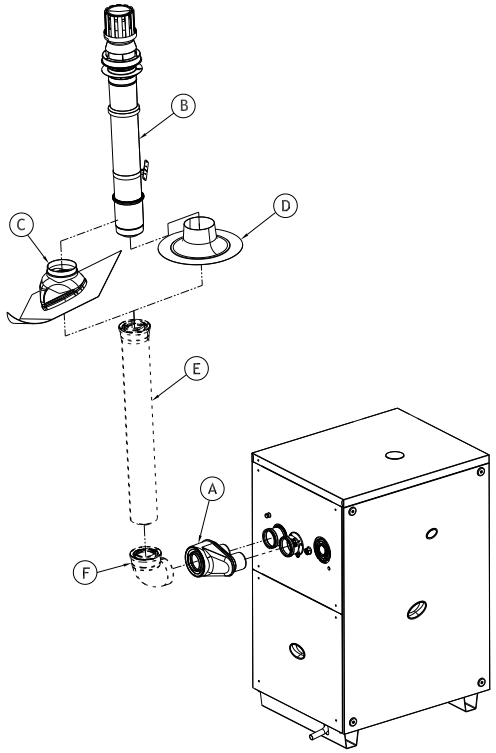
Wall mounted co-axial outlet DN80/125 or DN60/100

The following table indicates which accessories are required for the installation shown in Figure 5.5 C13 type installation → 37

Table 5.4 – C13 type installation: wall mounted co-axial terminal

DN	Ref.	Description
80/125	A	DN80/125 2xDN80 double fitting
	B	Co-axial wall terminal DN80/125
	E	Co-axial pipe 80/125 L=1 m
	E	Co-axial pipe 80/125 L=2 m
	F	Co-axial bend 90° 80/125
	F	Co-axial bend 45° 80/125
60/100	A	DN60/100 2xDN80 double fitting
	B	Co-axial wall terminal DN60/100
	E	Co-axial pipe 60/100 L=1 m
	E	Co-axial pipe 60/100 L=2 m
	F	Co-axial bend 90° 60/100
	F	Co-axial bend 45° 60/100

Figure 5.6 – C33 type installation



LEGEND
See table below

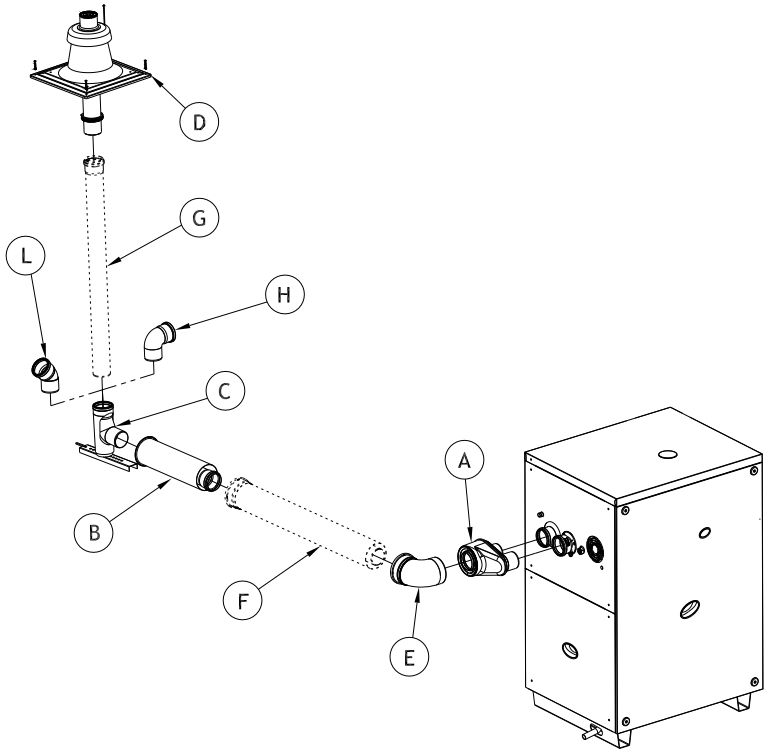
Roof mounted co-axial outlet DN80/125 or DN60/100

The following table indicates which accessories are required for the installation shown in Figure 5.6 C33 type installation → 38.

Table 5.5 – C33 type installation: roof mounted co-axial terminal

DN	Ref.	Description
80/125	A	DN80/125 2xDN80 double fitting
	B	Co-axial roof terminal 80/125
	C	Tile adaptor for sloped roof
	D	Tile adaptor for flat roof
	E	Co-axial roof pipe 80/125 L=1 m
	E	Co-axial roof pipe 80/125 L=2 m
	F	Co-axial bend 90° 80/125
	F	Co-axial bend 45° 80/125
60/100	A	DN60/100 2xDN80 double fitting
	B	Co-axial roof terminal 60/100
	C	Tile adaptor for sloped roof
	D	Tile adaptor for flat roof
	E	Co-axial roof pipe 60/100 L=1 m
	E	Co-axial roof pipe 60/100 L=2 m
	F	Co-axial bend 90° 60/100
	F	Co-axial bend 45° 60/100

Figure 5.7 – C43 type installation



LEGEND
See table below

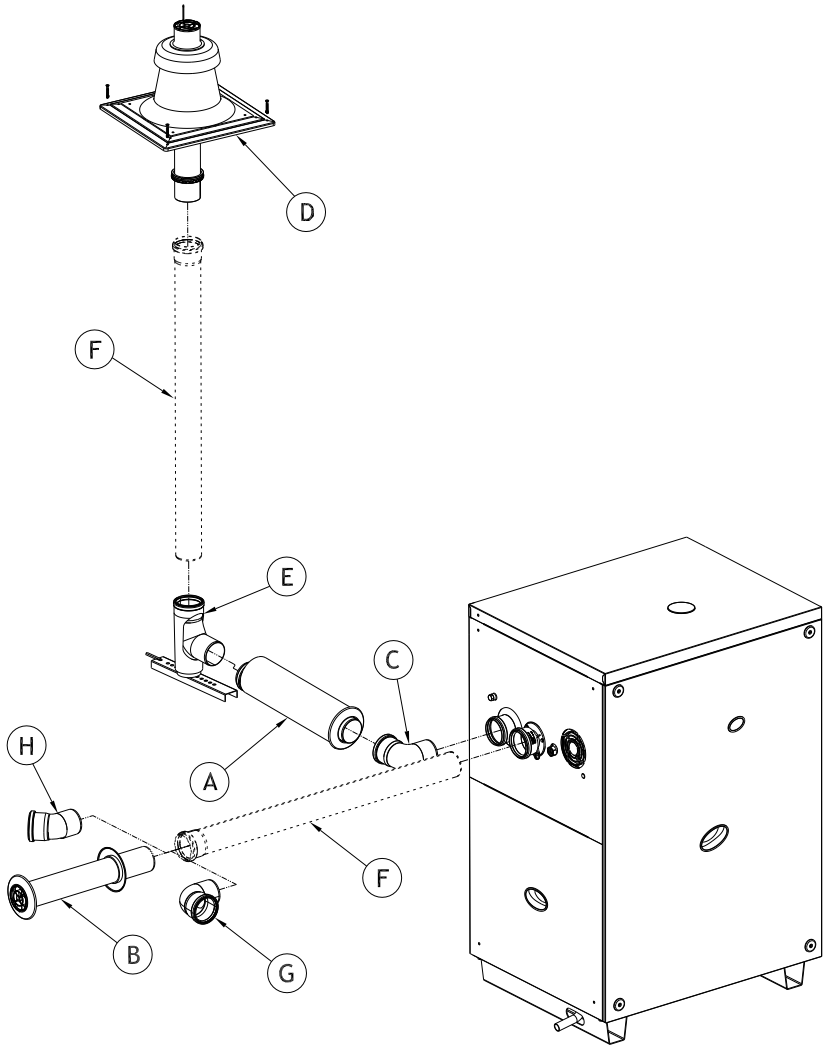
Fumes/combustion air collective pipes

The following table indicates which accessories are required for the installation shown in Figure5.7 C43 type installation → 39

Table 5.6 – C43 installation.

DN	Ref.	Description
80/125	A	DN80/125 2xDN80 double fitting
	B	Wall duct DN 80/125
	C	Flue mount kit DN80
	D	Flue cover DN80 with terminal
	E	Co-axial bend 90° 80/125
	E	Co-axial bend 45° 80/125
	F	Co-axial pipe DN80/125 L=1 m
	F	Co-axial pipe DN80/125 L=2 m
	G	Pipe DN 80 L=1 m
	G	Pipe DN 80 L=2 m
	H	Bend 90° DN80
	L	Bend 45° DN80
60/100	A	DN60/100 2xDN80 double fitting
	B	Wall duct DN 60/100
	C	Flue mount kit DN60
	D	Flue cover DN60 with terminal
	E	Co-axial bend 90° DN60/100
	E	Co-axial bend 45° DN60/100
	F	Co-axial pipe DN60/100 L=1 m
	F	Co-axial pipe DN60/100 L=2 m
	G	Pipe DN 60 L=1 m
	G	Pipe DN 60 L=2 m
	H	Bend 90° DN60
	L	Bend 45° DN60

Figure 5.8 – C53 type installation



LEGEND
See table below

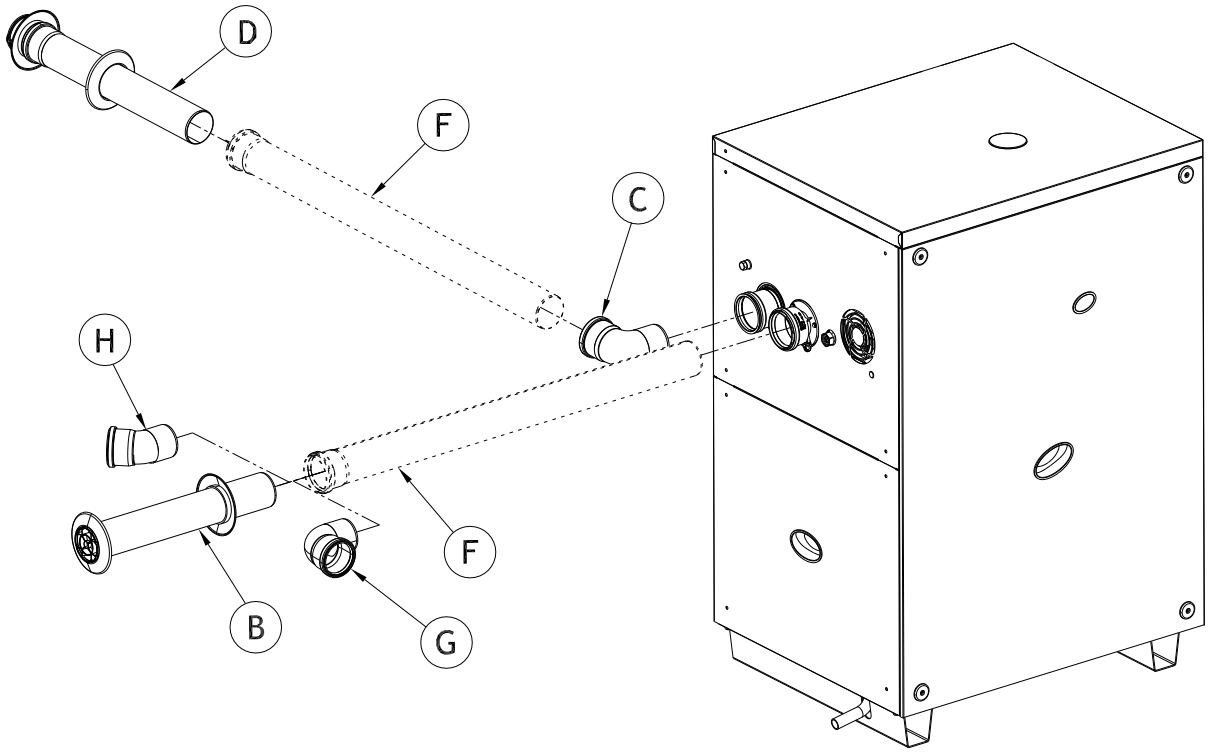
Roof mounted flue, wall mounted air intake

The following table indicates which accessories are required for the installation shown in Figure 5.8 C53 type installation → 40

Table 5.7 – C53 type installation: Roof mounted flue, wall mounted combustion air intake

DN	Ref.	Description
80	A	Double intake/exhaust kit DN80
	B	
	C	
	D	Flue cover DN80 with terminal
	E	Flue mount kit DN80
	F	Pipe DN80 L = 1 m
	F	Pipe DN80 L = 2 m
	G	Bend 90° DN80
	H	Bend 45° DN80

Figure 5.9 – C53 type installation



LEGEND
See table below

Double wall mounted exhaust

The following table indicates which accessories are required for the installation shown in Figure 5.9 C53 type installation → 41

Table 5.8 – C53 type installation

DN	Ref	Description
80	B	Wall mounted terminal kit DN80
	C	
	D	
	F	Pipe DN80 L=1 m
	F	Pipe DN80 L=2 m
	G	Bend 90° DN80
	H	Bend 45° DN80

Double wall mounted exhaust

Table 5.9 – Fumes temperature and flow

Gas type	Thermal capacity	CO_2 (%)	TF (C°)	Fumes flow (kg/h)	Prevalenza residua (Pa)
G20	Nominal	9,10	65	42	80
	Minimum	8,90	46	21	80
G25	Nominal	9,10	63,6	42	80
	Minimum	8,90	45,7	21	80
G25.1	Nominal	10,10	65	45	80
	Minimum	9,60	46	23	80
G27	Nominal	9,0	64	42	80
	Minimum	8,5	46	21	80
G2.350	Nominal	9,00	62,7	42	80
	Minimum	8,70	46,8	22	80
G30	Nominal	10,40	65	43	80
	Minimum	10,10	46	22	80
G31	Nominal	9,10	65	48	80
	Minimum	8,90	46	24	80

5.8 PROGRAMMING OF HYDRAULIC PARAMETERS

The operations described in this paragraph are necessary only if the appliance is not connected to a DDC or to a CCP.

If the appliance is connected to a CCP/DDC, follow the instructions given in the CCP/DDC manuals exclusively.

This paragraph explains how to set the hydraulic parameters on the electronic board of the appliance. Users not familiar with the basic procedures for the use of the board should refer to Paragraph 4.2 ON-BOARD ELECTRONICS → 19.
To configure the appliance, access menu 3 of the electronic board.
With regard to the hydraulic configuration, six parameters may be set: select the letter E to exit to the previous menu.

Table 5.10 – Parameters for hydraulic configuration

HYDRAULIC PARAMETER	THE DISPLAY SHOWS
Select cold water thermostating	3. 73
Cold water set-point	3. 75
Cold water temperature differential	3. 76
Hot water thermostat control selection	3.160
Hot water setpoint	3.161
Hot water temperature differential	3.162
(EXIT MENU)	3. E

Menu 3 parameters.

Description of parameters:

- Water thermostat control, parameters 73 and 160. This parameter takes two values: "0" and "1". Value "0" indicates that the appliance's "activation/deactivation" temperature is to be read by the water probe at the appliance's INTAKE. Value "1" indicates that the appliance's "activation/deactivation" temperature is to be read by the water probe at the appliance's OUTLET.
- Water set-point, parameters 75 and 161: these parameters set the water temperature that, when reached, causes the appliance to be deactivated (when the power modulation is not active - parameter 181).
- Water differential, parameters 76 and 162: these parameters represent an interval in degrees that, when added to the set-point, defines the temperature at which the appliance is reactivated. These parameters are used only if the power modulation is NOT active (parameter 181).

The appliance functions by heating/cooling the water until it reaches the set-point temperature. At this point, if the power modulation is not active (parameter 181), it switches off. The temperature of the water goes down again until it reaches the temperature corresponding to "set-point + differential"; when this is reached the appliance switches on again.
Example (heating):
Thermostating: reading from inlet sensor.
Parameter 181: 0 (power modulation NOT active)
Set-point: +40.0°C
Differential: - 2.0° C

- The appliance is functioning: the water in the plant heats up until it reaches the set-point temperature = +40°C.

- The appliance switches off: the water in the plant, returning from use, becomes progressively cooler, until it reaches a temperature of 38°C = 40°C - 2°.
- The appliance switches on again, and the plant water heats up again.
- The cycle is repeated.

The following procedure illustrates in detail how to configure the parameters on the electronic board inside the appliance.

If the procedures for how to access the knob and menus are not familiar, see paragraphs "Display and knob" and "How to access the menus" and following.

To set the parameters of menu 3:

You will need: the appliance on and access to the electrical panel, see "Display and knob".

Access menu 3. The display shows the first parameter of the menu, number 73.

1. Turn the knob clockwise to scroll through the parameters: 3.73, 3.75, 3.76, 3.160, 3.161, 3.162; lastly the letter E is shown.
2. Press the knob when a parameter is displayed to select it, or when E is displayed to exit the menu.
3. For example, to set parameter 161 (hot water set-point), proceed as follows:
   · Select the parameter: turn the knob until the display shows 3.161;
   · Press the knob to access the value of the parameter; the display shows the previously set value, which flashes, for example 40.0 °C;
   · Turn the knob to modify the value of the parameter;
   · Press the knob to confirm the value selected; the display shows the current parameter again, 3.161. The new value for this parameter has been set.
4. If other parameters are to be modified, proceed as described previously, and then exit from the menu by pressing the knob on the letter E.

To exit the menu, turn the knob clockwise until E is displayed, then press it to confirm. For details regarding the codes displayed by the appliance during operation, see Paragraph 9.1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING → 82.

5.9 SAFETY VALVE DISCHARGE ROUTING

Standard EN378-3 requires that potential leaks of refrigerant be discharged outside the machine room.
To meet this requirement, the appliance has an outlet on its top panel (detail Q of Figure 3.1 Size → 15) to which a pipe can be fitted to route the refrigerant vented by the safety valve on the sealed circuit out of the machine room.

DO NOT fit any check equipment (valve, etc.) between outlet Q (Figure 3.1 Size → 15) and the external discharge of the evacuation pipe. The manufacturer does not accept any contractual or extra-contractual liability for any damage caused by improper use of the said pipe.

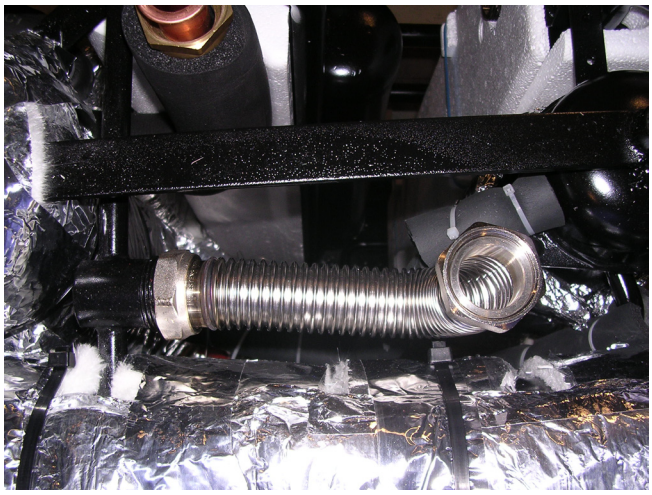
The missing right installation of the canalization of the security valve might cause dangerous situations inside the installation room. The unit can be switched-on only if the right canalitation is installed, as indicated in the following.

Install the pipe as instructed below.

You will need: the appliance in its permanent location.

1. Remove the plastic cap on the top panel (detail Q of Figure 3.1 Size → 15).
2. Connect a carbon steel pipe to the Q outlet, which must have an initial straight tract of at least 30 cm. The maximum length of the pipe is indicated in Table 5.11 Maximum coolant pipe length → 44).
3. Fix the pipe to the nut on the outlet (5.10 Over-pressure valve → 44) and make sure to fit the Teflon gasket provided with the appliance for this purpose.

Figure 5.10 – Over-pressure valve



LEGEND
Detail of the refrigerant flexible ducting pipe

Position of the valve

4. The evacuation terminal must be outside the machine room, away from doors, windows and ventilation openings; the terminal must be located at a height such as to prevent any leaks of refrigerant fluid being inhaled by persons walking in the vicinity of the terminal itself.

The refrigerant discharge pipe MUST be in carbon steel. NEVER use copper or derivate alloys such as brass for this purpose.

The missing canalitation of the security valve might cause danger conditions inside the installation room.

Table 5.11 – Maximum coolant pipe length

Diameter	DN	Maximum length (m)
1" 1/4	32	30
2"	52	60

Maximum coolant pipe length

6 ELECTRICAL INSTALLATION

This section illustrates the operations to perform for the correct electrical installation of the appliance, and contains electrical diagrams that may be of use in the event of maintenance operations.

Installation of the appliance may only be carried out by firms that are qualified in accordance with current legislation in the country of installation, i.e. by professionally qualified personnel.

Before proceeding with operations to create the electrical plant of the appliance, the professionally qualified personnel concerned are advised to read Paragraph 3.1 GENERAL INFORMATION → 8: it provides important information regarding installation safety and references to current norms.

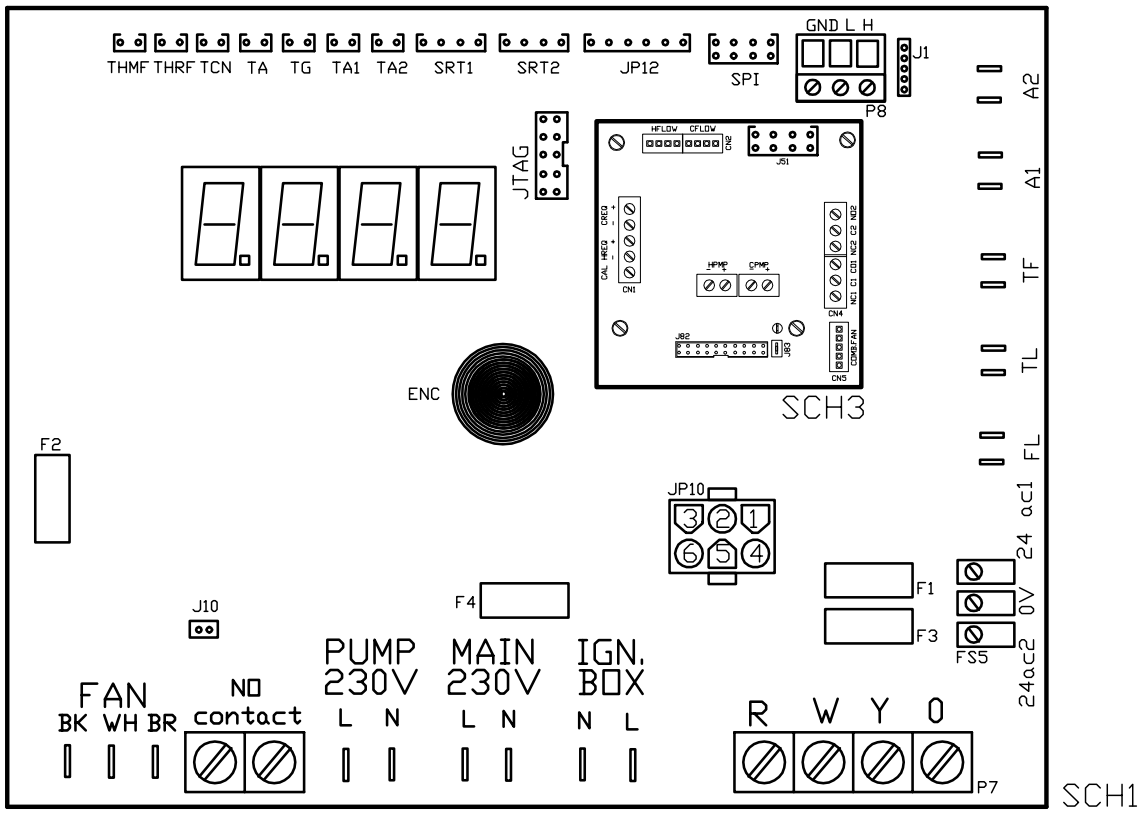
Installation that is incorrect or that does not comply with current legislation may cause damage to people, animals or things; Robur S.p.A. is not responsible for any damage caused by installation that is incorrect or that does not comply with current legislation.

Figure 6.1 Electronic board S61 → 46 and Table 6.1 S61 electronic controller + Mod10 legend → 46 provide details of input and ouput of the S61 electronic board. The auxiliary electronic card Mod10 is shown in detail in Figure 6.2 Mod10 controller → 47.
The appliance and the system can be controlled and regulated in one of the following ways depending on the type of installation and control system selected:

- **TYPE A**: controlled by CCP (see Figure 6.4 Comfort Control Panel e Accessory → 48, detail CCP).
- **TYPE B**: controlled by DDC (see Figure 6.3 CCI/DDC → 47).
- **TYPE C**: controlled by consent switch (e.g. on-off switch, ambient thermostat, timer, etc.).

In Paragraph 6.1 ELECTRICAL DIAGRAM OF THE APPLIANCE → 49 may be found the Electrical diagrams of the appliance.

Figure 6.1 – Electronic board S61



LEGEND
See table below

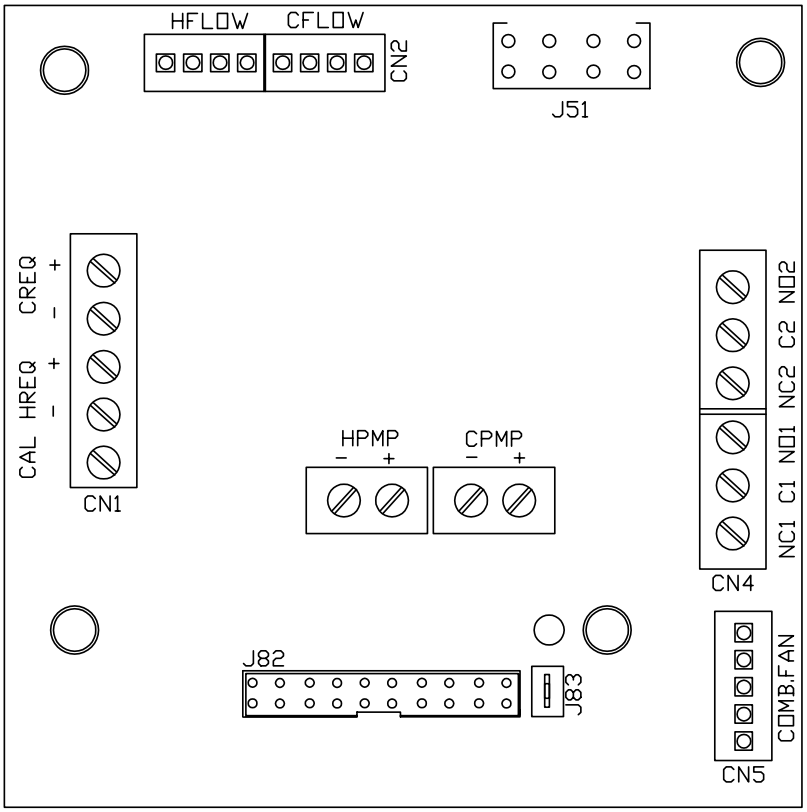
SCH S61

Table 6.1 – S61 electronic controller + Mod10 legend

CODE	DESCRIPTION
SCH1	Electronic board S61
SCH3	Mod10 electronic controller (see figure for further details)
A1, A2	Auxiliary inputs
ENC	Knob
F1	Fuse T 2A
F2	Fuse F 10A
F3	Fuse T 2A
F4	Fuse T 3.15A
FAN (BK, WH, BR)	Cooling fan output
FL	Flow switch input
FS5 (24V AC)	Controller power 24-0-24 Vac
IGN.BOX (L, N)	Flame controller power 230 V AC
J1	CAN BUS jumper
J10	Jumper N.O. contact
J82	W10 board connector (on Mod10)
JP10	6-pole flame controller connector
JP12	Fumes sensor or generator fin sensor input
JTAG	S61 controller programming connector
MAIN 230V (L,N)	S61 controller power 230 V AC
N.O. contact	Pump contact, N.O.
P7 (R, W, Y, o)	Consent inputs
P8 (GND, L, H)	CAN BUS connector
PUMP 230V (L,N)	Hydraulic pump power output
SPI	Communication port with Mod10 controller
SRT1	Hydraulic pump rotation sensor input
SRT2	Hot water flowmeter input
TA	Ambient temperature probe input
TA1	Hot water delivery temperature probe input
TA2	Hot water return temperature probe input
TCN	Combustive air temperature probe input
TF	Exhausted gas thermostat input

CODE	DESCRIPTION
TG	Generator temperature probe input
THMF	Cold water delivery temperature probe input
THRF	Cold water return temperature probe input
TL	Generator limit thermostat input

Figure 6.2 – Mod10 controller



LEGEND

HFLOW	Not used
CFLOW	Condensation water sensor control
J51	SPI connector
HPMP	Primary circuit hot water pump control output (0-10 V) [A/GS/WS]
CPMP	Cold side water pump control output [GS/WS]
NC1-C1	Status indication of locking warnig/error
CN5	Blower control
J82	W10 auxiliary controller connector
J83	W10 cable shielding connection W10
CN1	Inputs 0-10V (not used)

Mod10 controller

Figure 6.3 – CCI/DDC

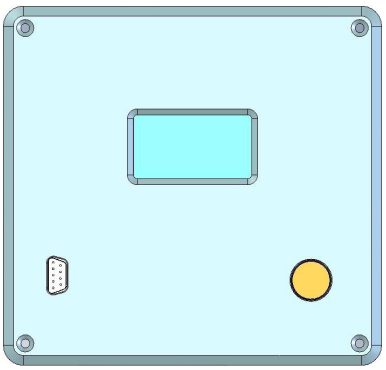
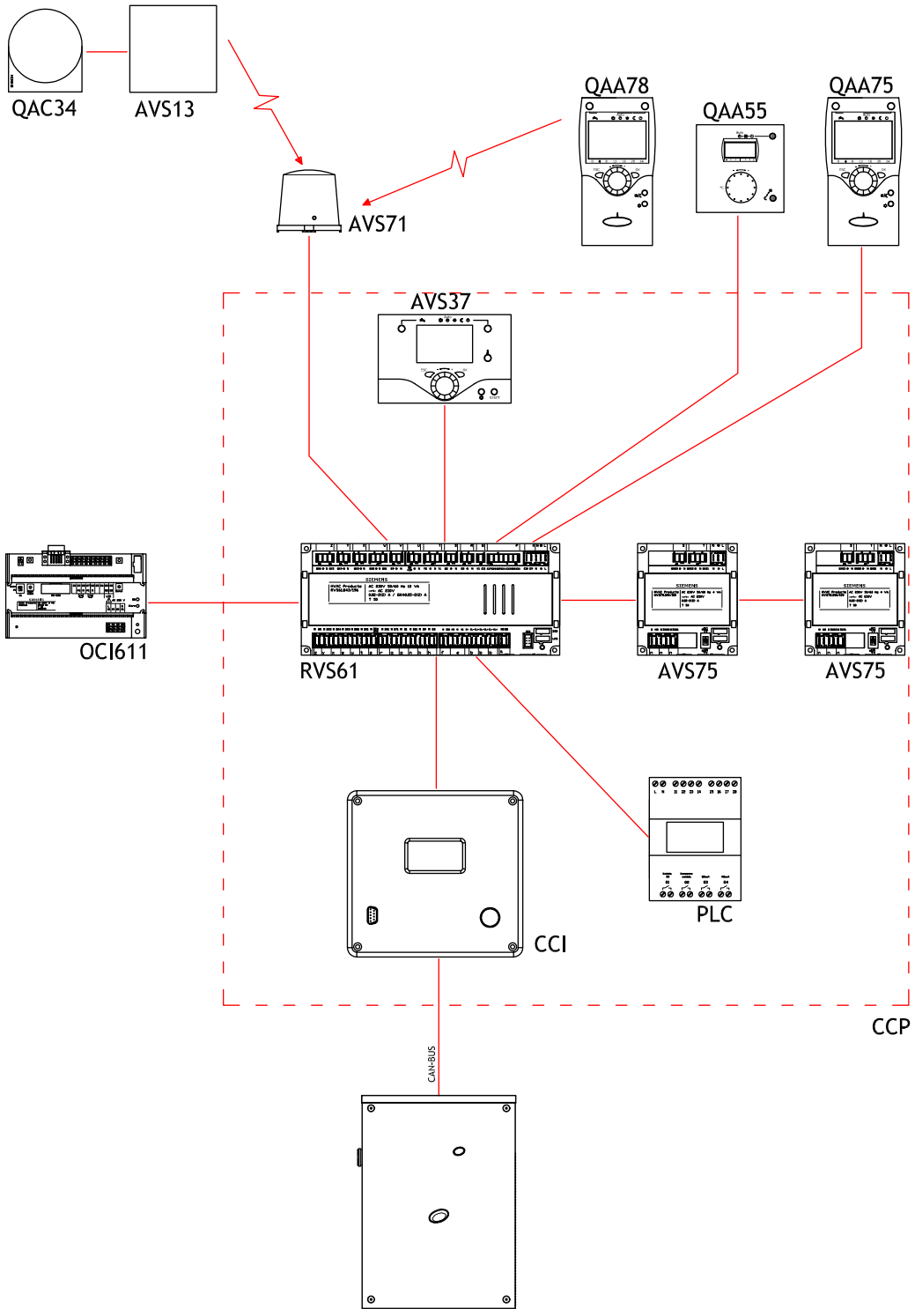


Figure 6.4 – Comfort Control Panel e Accessory



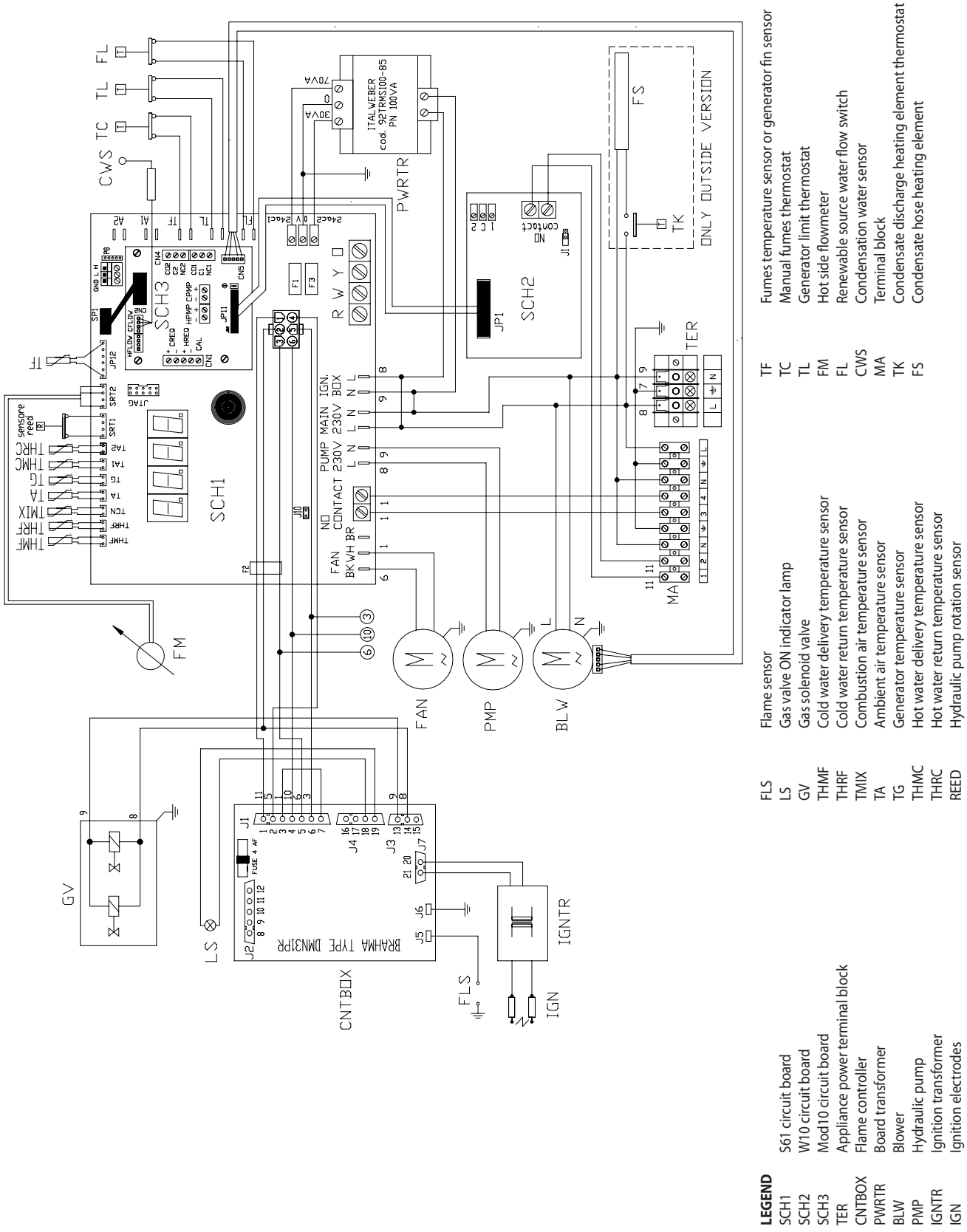
LEGEND

CCP	Comfort Control Panel
Components componing the CCP	
AVS37	Comfort Control Siemens
RVS61	System controller and set-point
CCI	Comfort Control Interface
PLC	Programmable Logic Control
AVS75	Expansion

Optional components to predict	
QAA55	Base room unit
QAA75	Room unit
QAA78	Radio room unit
ASV71	Antenna
AVS13	Transmitter
QAC34	External temperature probe
LPS	Central communications for remote control

6.1 ELECTRICAL DIAGRAM OF THE APPLIANCE

Figure 6.5 – Appliance internal wiring diagram



LEGEND				TF	Fumes temperature sensor or generator fin sensor
SCH1	S61 circuit board			TC	Manual fumes thermostat
SCH2	W10 circuit board	FLS	Flame sensor	TL	Generator limit thermostat
SCH3	Mod10 circuit board	LS	Gas valve ON indicator lamp	FM	Hot side flowmeter
TER	Appliance power terminal block	GV	Gas solenoid valve	FL	Renewable source water flow switch
CNTBOX	Flame controller	THMF	Cold water delivery temperature sensor	CWS	Condensation water sensor
PWRTR	Board transformer	THRF	Cold water return temperature sensor	MA	Terminal block
BLW	Blower	TMIX	Combustion air temperature sensor	TK	Condensate discharge heating element thermostat
PMP	Hydraulic pump	TA	Ambient air temperature sensor	FS	Condensate hose heating element
IGNTR	Ignition transformer	TG	Generator temperature sensor		
IGN	Ignition electrodes	THMC	Hot water delivery temperature sensor		
		THRC	Hot water return temperature sensor		
		REED	Hydraulic pump rotation sensor		

6.2 HOW TO CONNECT THE APPLIANCE ELECTRICALLY

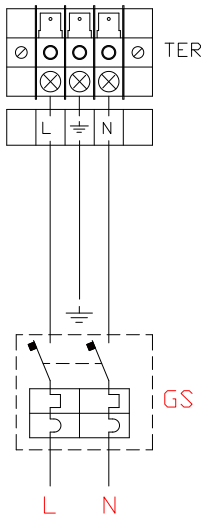
Before making electrical connections, make sure not to work on live elements.

You will need: the appliance in its permanent location.

1. Use a cable type FG7(O)R 3Gx1.5 for the power supply to the appliance.
2. Connect power supply with the cable indicated at point 1, fitting close to the appliance a two-pole isolator switch with 3 mm distance between contacts (see detail «GS» in Figure 6.6 Electrical wiring diagram ⟶ 50) and two 5A fuses type T or a 10A magnetothermic breaker.
3. Prepare the electrical connection in such a way that the ground wire is longer than the live wires. In this way it will be the last wire to be torn away if the cable is accidentally pulled off; this will ensure the ground connection.

Electrical safety is ensured only when the appliance is correctly connected to an efficient grounding system, realized according to current safety regulations. Do not use gas pipes as grounding.

Figure 6.6 – Electrical wiring diagram



LEGEND

TER	terminal board
L	phase
N	neutral
Components NOT SUPPLIED	
GS	general switch

Example of connection of appliance to 230 V 1 N - 50 Hz electricity supply

6.3 TYPE A (COMFORT CONTROL PANEL)

This paragraph illustrates the operations to be performed when one or more appliances are connected to a Comfort Control Panel (CCP). In particular:

1. What is the CAN BUS cable.
2. How to connect the CAN BUS cable to the appliance's electronic board
3. How to connect the CAN BUS cable to the Comfort Control Panel
4. How to connect the Comfort Control Panel
5. How to connect the system water circulation pumps

For specific information regarding the operation and programming of the CCP, refer to the specific manuals supplied with it.

The appliance and the CCP communicate with each other via a CAN bus network.

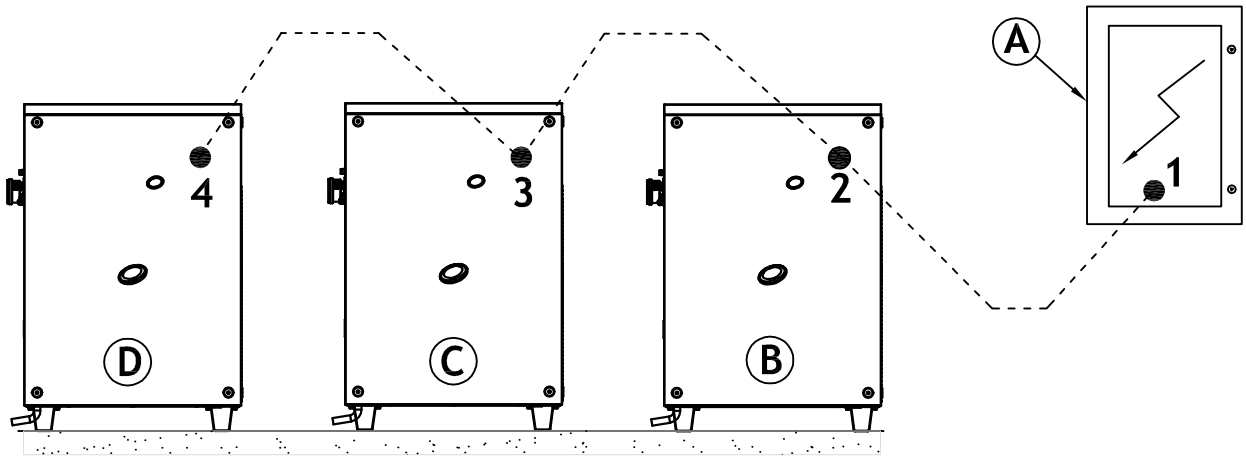
The CAN bus network is characterized by a series of elements (appliances or CCPs) called nodes, connected to each other by a three-wire cable. The nodes are of two types: terminal nodes and intermediate nodes.

- Terminal nodes are appliances or CCPs that are connected to one other element only.
- Intermediate nodes are appliances or controllers which are connected to two other elements.

The diagram in Figure 6.7 Example of CAN BUS → 51 gives an example of a CAN BUS network: 3 appliances are connected to each other and to 1 CCP. Appliance D and the CCP (A) are terminal nodes, while appliances C and B are intermediate nodes as they are connected to 2 elements.

One CCP can control up to 3 appliances of the same type.

Figure 6.7 – Example of CAN BUS



LEGEND					
A	Controller	B-C-D	Appliance	2-3	Intermediate nodes
		1-4	Terminal nodes		

Terminal nodes and intermediate nodes

What is the CAN BUS cable

The cable to be used must be suitable for CAN BUS applications.

The following table gives details of some types of CAN BUS cables, grouped according to the maximum distance covered by each single type.

Table 6.2 – CAN BUS cables type

CABLE NAME	SIGNAL / COLOR			MAX LENGTH	Note
Robur					Ordering Code O-CVO008
ROBUR NETBUS	H= BLACK	L= WHITE	GND= BROWN	450 m	
Honeywell SDS 1620					In all cases the fourth conductor should not be used
BELDEN 3086A	H= BLACK	L= WHITE	GND= BROWN	450 m	
TURCK type 530					
DeviceNet Mid Cable					
TURCK type 5711	H= BLUE	L= WHITE	GND= BLACK	450 m	
Honeywell SDS 2022					
TURCK type 531	H= BLACK	L= WHITE	GND= BROWN	200 m	

Example types of cables used to connect the CAN network.

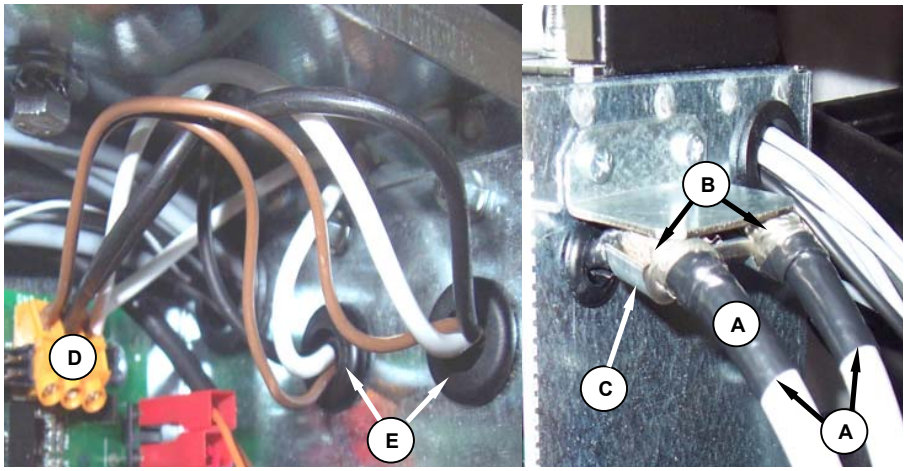
For total distances lower than 200 m and networks with a maximum of 4 nodes (example: up to 3 GAHP + 1 controller) a simple shielded cable 3x0.75 mm may be used.

As shown in Table 6.2 CAN BUS cables type → 51, the CAN connection requires a CAN BUS cable with 3 cores. If the cable available has more than 3 coloured wires, use the wires with the colours indicated in 6.2 CAN BUS cables type → 51 and cut the remaining ones.
The ROBUR NETBUS cable is available as an accessory, see Section 8 ACCESSORIES → 81.

How to connect the CAN BUS cable to the appliance's electronic board

The CAN BUS cable must be connected to the dedicated terminals on the appliance's electronic board, as shown below (see Figure 6.8 CAN BUS cable connection → 52).

Figure 6.8 – CAN BUS cable connection



LEGEND

A	protective isolating tape
B	shielding of CAN BUS cable (pre-wired to last unit)
C	cable bracket (the CAN BUS cables of an intermediate node are present)
D	CAN BUS/circuit board connector
E	wires (6) of the CAN BUS cable (intermediate node)

Example of a single CAN bus cable connected to the board

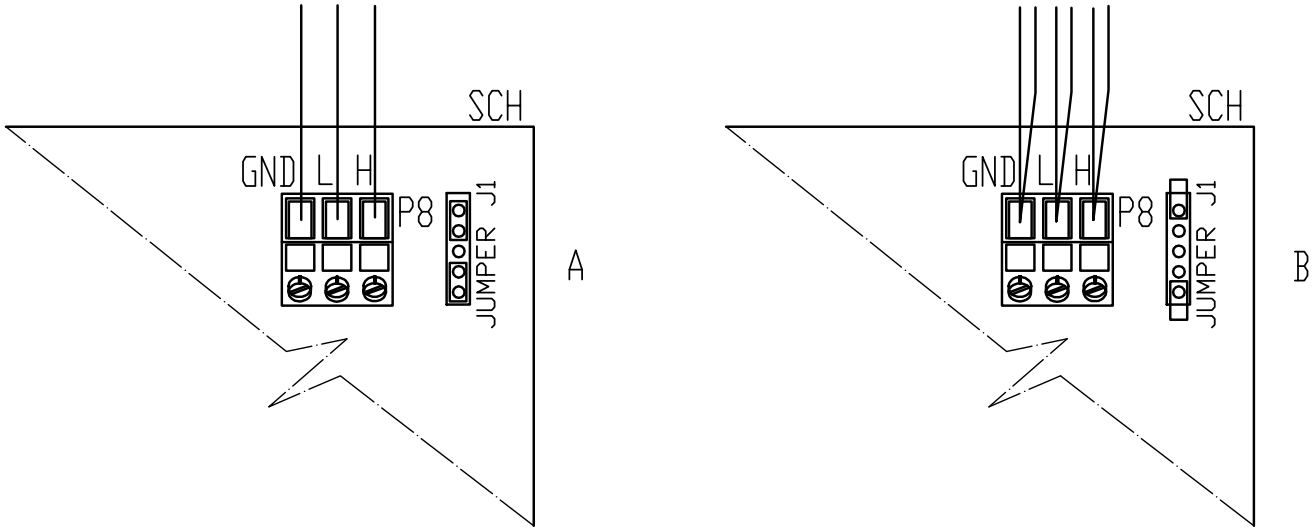
Before working on the electrical panel of the appliance, make sure that power supply is off.

1. Cut a length of cable long enough to allow installing it without kinking.
2. On one end of the cable, remove the jacket for a length of approximately 70-80 mm, taking care not to cut the shielding (metal mesh and/or aluminium sheet and, if present, the bare connector in touch with the shield) and the wires contained within.
3. If the cable is too thin to be held in place in the cable holding bracket (detail C in Figure 6.8 CAN BUS cable connection → 52), make it thicker by wrapping insulating tape around the jacket close to the stripped part (to an approximate diameter of 12-13 mm).
4. Pull back the shielding on the jacket; apply isolating tape to the end of the shielding as pulled back (detail A, Figure 6.8 CAN BUS cable connection → 52).
5. If the appliance is a **terminal node** of the network connect the three coloured wires to the orange connector as shown in detail "A" of Figure 6.9 Electrical wiring diagram → 53. Respect the correct indications L, H, GND provided in Table 6.2 CAN BUS cables type → 51, on the figure and on the electronic board below the connector.
6. If the appliance is an **intermediate node** repeat the operations from step 2 to step 5 for the other cables required (in this way you will have two cable lengths each one without the jacket on one end). Twist together the cores with the same color and connect them to the orange connector, as shown in detail "B" of Figure 6.9 Electrical wiring diagram → 53.

7. Fix the CAN BUS cable (or two cables, according to the type of node being connected) to the holding bracket in the upper part of the electrical panel so that the pulled-back shielding is in solid touch with the metal bracket. The cables must be firmly held in place by the bracket if pulled.
   In order to position the jumpers on the electronic board according to the type of node being configured:

- If the appliance is a **terminal node** on the network (i.e. 3 wires are inserted in the orange connector on the board): set the jumpers as shown in detail "A" of Figure 6.9 Electrical wiring diagram → 53:
- If the appliance is an **intermediate node** on the network (i.e. 6 wires are inserted in the orange connector on the board); set the jumpers as shown in detail "B" of Figure 6.9 Electrical wiring diagram → 53:

Figure 6.9 – Electrical wiring diagram



LEGEND					
SCH	electronic board	H	Data signal HIGH	B	Detail case "intermediate node" (6 wires; J1=jumper "open")
GND	Common data	J1	Jumper CAN-BUS in board		
L	Data signal LOW	A	Detail case "terminal node" (3 wires; J1=jumper "closed")	P8	Port can/connector

Connection cable CAN BUS to electronic board: detail A case "terminal node", detail B case "intermediate node"

8. After finished with all the above operations, close the electrical panel and refit the front panel of the appliance.

How to connect the CAN BUS cable to the Comfort Control Panel

The CAN bus cable is connected to the specific orange connector (P8) supplied with the CCP in a bag.

Before working on the Comfort Control Panel, make sure that it is off.

The CCP, like the controller on the appliance, has jumpers that must be moved so that it can be configured as an intermediate or terminal node. The position of the jumpers on a new CCP is CLOSED.

To connect the CAN bus cable to a CCP:

You will need: the Comfort Control Panel not powered up.

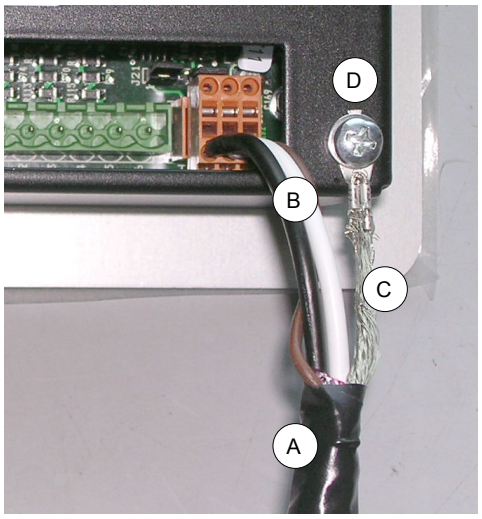
1. Open the Comfort Control Panel's electrical panel with the handle on its left.

2. Depending on the type of node being configured, set the CCI's jumpers J21 as shown in detail "A" or detail "B" in Figure 6.11 Connection of CCI to CAN-BUS network → 55. If necessary, open the CCI's back panel (4 screws); after jumpers J21 have been correctly positioned, close the cover again and retighten the 4 bolts.
3. Cut a length of cable long enough to allow installing it without kinking.
4. Remove the sheath for a length of approximately 70-80 mm, taking care not to cut the shielding (metallic shield and/or aluminium sheet and, if present, the bare connector in contact with the shield) and wires contained inside.
5. Roll the shielding and connect it to a 4-mm eyelet terminal, as illustrated in Figure 6.10 Connection from CAN BUS to connector P8 → 55, details C and D. Now proceed as follows:
6. If the CCP is a **terminal node** of the network connect the three coloured wires to the orange connector "P8", as shown in detail "A" of Figure 6.11 Connection of CCI to CAN-BUS network → 55. Observe the terminal markings L, H, GND (on the CCI's board at the base of the socket "P8") which are given both in Table 6.2 CAN BUS cables type → 51 and in the example.
7. If the CCP is an **intermediate node** repeat the operations from step 2 to step 4 for the other length of CAN bus cable required. Connect the six coloured wires to the orange connector "P8", following the instruction provided in detail "B" of Figure 6.11 Connection of CCI to CAN-BUS network → 55. Observe the terminal markings L, H, GND (on the CCI's board at the base of the socket "P8") which are given both in Table 6.2 CAN BUS cables type → 51 and in the example.
8. Insert the orange connector "P8" with the wires first into the opening prepared in the cover of the CCI, and then into the appropriate socket on the CCI itself, making sure it is correctly inserted.
9. Use the rear cover bolts located near the CAN BUS socket to secure the 4-mm eyelet (or 2 eyelets) (detail D, Figure 6.10 Connection from CAN BUS to connector P8 → 55). The cable should be secured against pulling out.

The CCI has jumpers J21: the position of the jumpers, depends if the CCI is an intermediate or terminal node, must be as shown in Figure 6.11 Connection of CCI to CAN-BUS network → 55.

The CCI is equipped with a backup battery which retains the memory settings in case of power failure. **The backup battery lasts approximately 7 years**, after which time it must be replaced by an authorised Robur Technical Assistance Centre.

Figure 6.10 – Connection from CAN BUS to connector P8

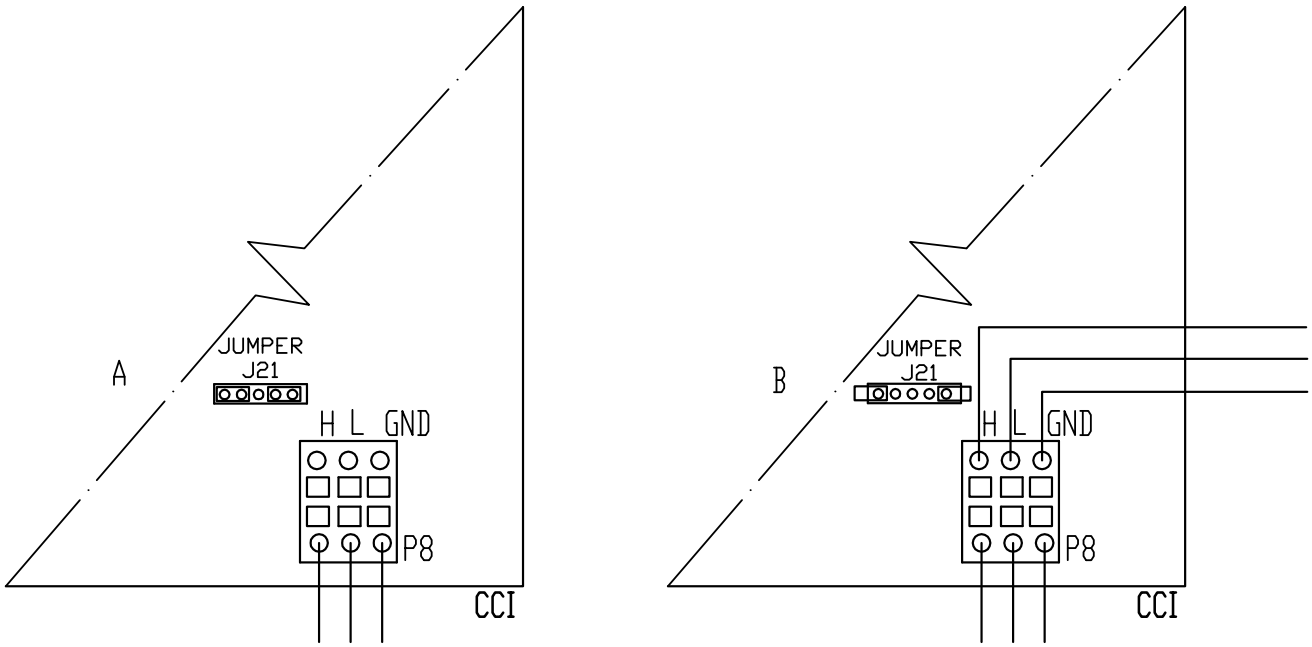


LEGEND

A	Insulating tape to protect board/shield
B	CAN BUS cable wires
C	CAN bus cable shield
D	terminal and screw for fixing

Connection detail of cable CAN BUS.

Figure 6.11 – Connection of CCI to CAN-BUS network



LEGEND

CCI	Comfort Control Interface
P8	Orange connector
J21	Jumpers CAN-BUS on CCI board

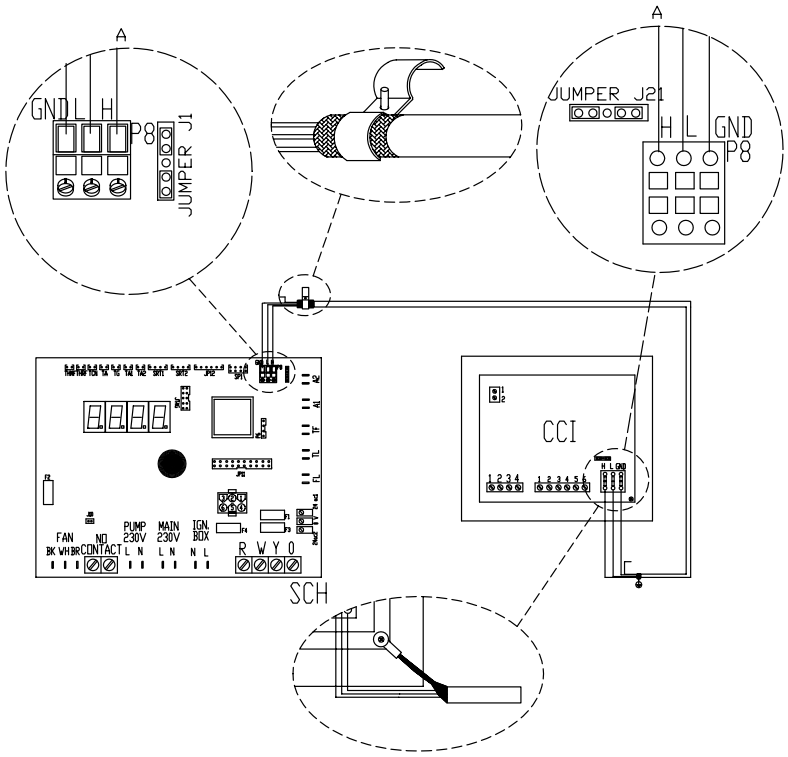
A	detail of "terminal node" case (3 wires; J21=jumper "closed")
B	Detail of "intermediate node" case (6 wires; J21=jumper "open")

H,L,GND Data signal wires

Jumpers J21 closed

The following wiring diagrams show the connection of the CCI to 1 appliance (Figure 6.12 Connection of CCI to 1 appliance → 56) and 3 appliances (Figure 6.13 Connection of CCI to 3 appliances → 57) respectively.

Figure 6.12 – Connection of CCI to 1 appliance



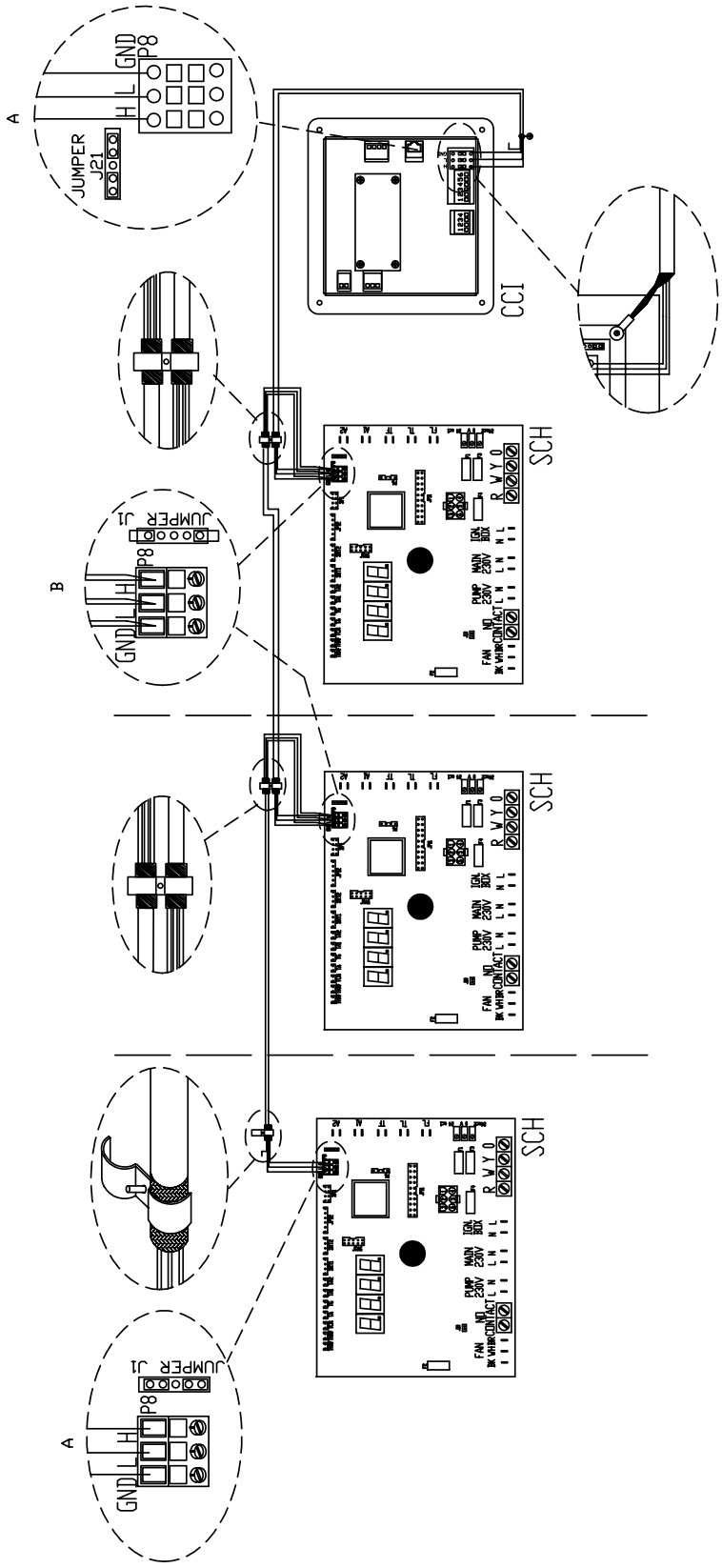
LEGEND

SCH S61 controller

CCI Comfort Control Interface

Connection of CCI to 1 appliance

Figure 6.13 – Connection of CCI to 3 appliances



LEGEND

SCH S61 controller

CCI Comfort Control Interface

Connection of CCI to 3 appliances

How to connect the Comfort Control Panel

You will need: the appliance disconnected from the electricity supply

1. The Comfort Control Panel's power cord must be type tipo FG7 3Gx2.5mm^2. the power supply is 230V AC 1N 50Hz.
2. Cut a suitable length of cable.
3. The cable must be connected to the terminal block on the bottom right of the Comfort Control Panel. First make a hole in the electrical cabinet near to the terminal block and pass the cable through it.
4. Connect the cable to the terminal block as given in Figure 6.6 Electrical wiring diagram → 50 and fit a 10 A thermal cut out upstream of the Comfort Control Panel.

How to connect the system water circulation pumps

Before making the electrical connections, make sure that work is not carried out on live elements.

To optimise the operation of the appliance install, on the primary circuit, variable rate WILO STRATOS PARA pumps (see Section 8 ACCESSORIES → 81), which are controlled and modulated with the Robur Mod10 controller.

No other models pump are supported.

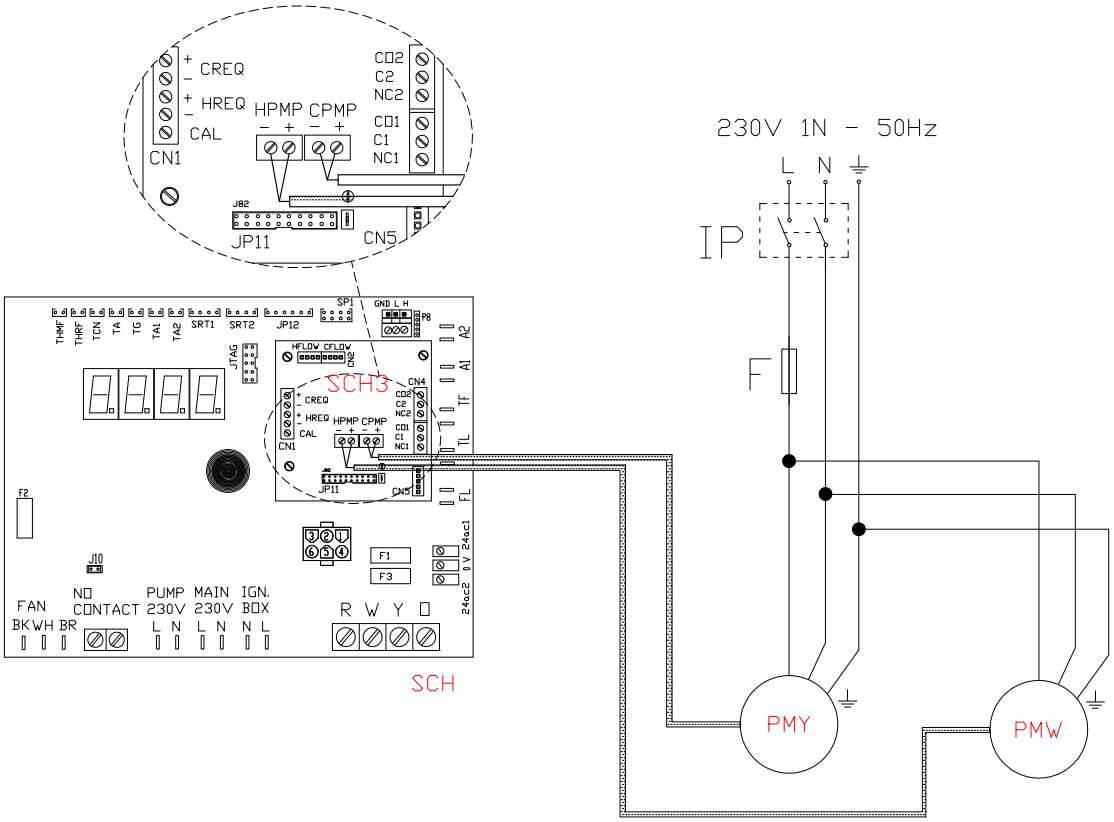
The instruction for connecting the WILO STRATOS PARA pumps are given below (see Section 8 ACCESSORIES → 81).
Each WILO pump includes its power cord (length 1.5 metres) and cable for connection to the appliance's controller (1.5 metres). For longer cable runs, use a shielded 2x0.75 mm^2 0-10V signal cable and a FG7 3Gx2.5mm^2 power cord.

You will need: the appliance in its permanent location.

1. Check that power supply is off.
2. Remove the front panel of the appliance and the cover of the electrical panel.
3. Connect the brown wire of the WILO STRATOS PARA pump on the cold side to the terminal "-" of connector CPMP on the Mod10 board. Connect the white wire of the WILO STRATOS PARA pump on the cold side to the terminal "+" of the connector CPMP on the Mod10 board. Insulated black and blue wires (see Figure 6.14 Wiring diagram for connection of Wilo variable rate pumps → 59).
4. Connect the brown wire of the WILO STRATOS PARA pump on the hot side to the terminal "-" of connector HPMP on the Mod10 board. Connect the white wire of the WILO STRATOS PARA pump on the hot side to the terminal "+" of the connector HPMP on the Mod10 board. Insulated black and blue wires (see Figure 6.14 Wiring diagram for connection of Wilo variable rate pumps → 59).
5. Collegare la pompa alla rete elettrica prevedendo a monte un interruttore esterno bipolare (vedi particolare IP di Figura 6.14 Wiring diagram for connection of Wilo variable rate pumps → 59) con fusibile da 2 A ritardato oppure collegarla ai morsetti interni al quadro elettrico dell'unità (vedi particolare MA di Figura 6.15 Wiring diagram for hooking up the Wilo variable rate pump powered by the unit → 60).
6. After finished with all the above operations, close the electrical panel and refit the front panel of the appliance.

NEVER switch on or off the WILO STRATOS PARA pump through the switch on the power supply.

Figure 6.14 – Wiring diagram for connection of Wilo variable rate pumps



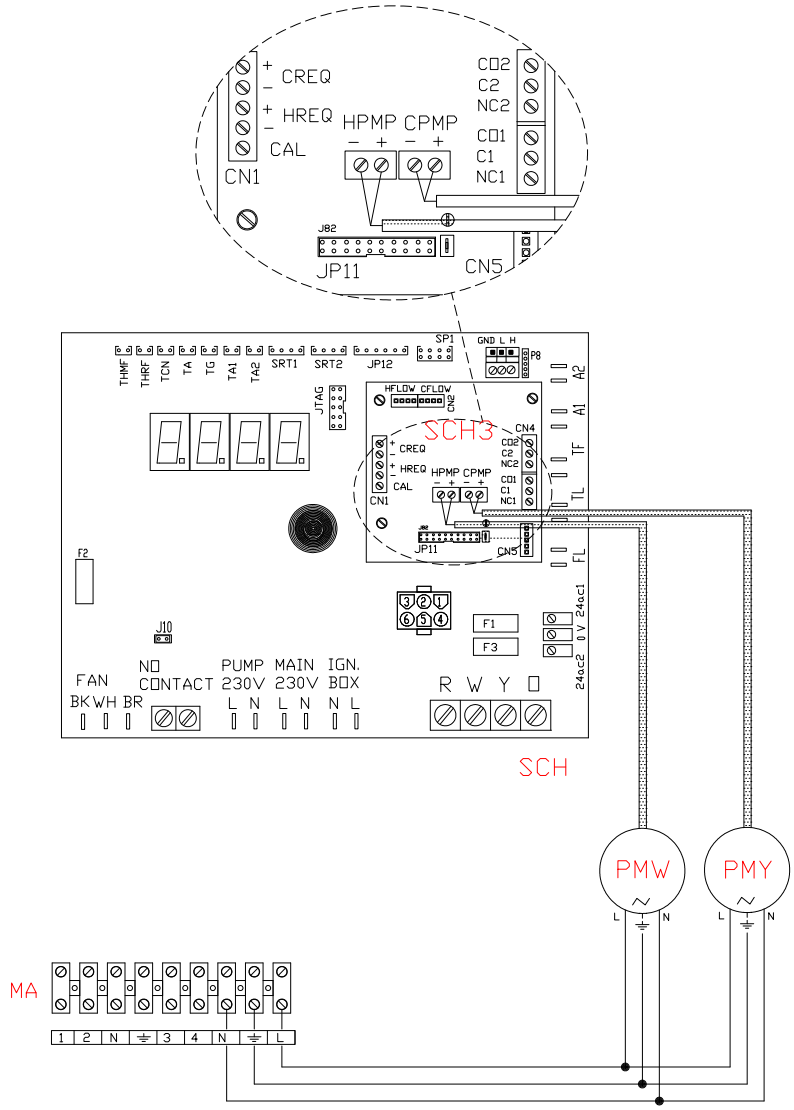
LEGEND

IP	Two-position pump power switch
F	Fuse
PMW	Hot side water circulation pump (primary circuit)
PMY	Cold side water circulation pump

Pump signal 0-10V wire colours
brown connect to -ve
white white connect to +ve
black isolate
blue isolate

Wiring diagram for connection of Wilo variable rate pumps

Figure 6.15 – Wiring diagram for hooking up the Wilo variable rate pump powered by the unit



LEGEND

PMW	Hot side water circulation pump (primary circuit)
PMY	Cold side water circulation pump
MA	Unit terminal block

Pump signal 0-10V wire colours
brown connect to -ve
white connect to +ve
black isolate
blue isolate

Wiring diagram for hooking up the Wilo variable rate pump powered by the unit

6.4 TYPE B (DDC)

This paragraph illustrates the operations to be performed when one or more appliances are connected to a Direct Digital Controller (DDC). In particular:

1. What is the CAN BUS cable.
2. How to connect the CAN BUS cable to the appliance's electronic board
3. How to connect the CAN BUS cable to the DDC.
4. How to connect the DDC.
5. How to connect the plant water circulation pump.

For specific information regarding the DDC, refer to the specific manuals supplied with it.

The appliance and the DDC communicate with each other via a CAN bus network.
The CAN bus network is characterized by a series of elements (appliances or DDCs) called nodes, connected to each other by a three-wire cable. The nodes are of two types: terminal nodes and intermediate nodes.

- Terminal nodes are appliances or DDCs that are connected to one other element only.
- Intermediate nodes are appliances or DDCs that are connected to two other elements.

The diagram in Figure 6.7 Example of CAN BUS → 51 gives an example of a CAN BUS network:3 appliances are connected to each other and to 1 DDC. Appliance D and the DDC (A) are terminal nodes, while appliances C and B are intermediate nodes as they are connected to 2 elements.

It is possible to place one DDC at any point of the CAN bus network: appliances and DDCs may act equally as terminal or intermediate nodes. One DDC can control and monitor up to 16 appliances. If there are more than 16 appliances on the network, it is necessary to connect more than one DDC on the same network, up to a maximum of 3.

What is the CAN BUS cable

The cable to be used must be suitable for CAN BUS applications.

Table 6.2 CAN BUS cables type → 51 gives details of some types of CAN bus cable, grouped according to the maximum distance covered by each single type.

For overall distances to cover of ≤200 m and networks with a maximum of 6 nodes (a typical example: up to 5 GAHP + 1 DDC) a simple shielded cable 3x0.75 mm may be used.

As shown in Table 6.2 CAN BUS cables type → 51, the CAN connection requires a CAN bus cable with 3 wires. If the available cable has more than 3 coloured wires, use the wires with the colours indicated in 6.2 CAN BUS cables type → 51 and cut the remaining ones. The ROBUR NETBUS cable is available as an accessory, see Section 8 ACCESSORIES → 81.

How to connect the CAN BUS cable to the appliance's electronic board

The CAN BUS cable must be connected to the dedicated terminals on the appliance's electronic board, as shown below (see Figure 6.8 CAN BUS cable connection → 52).

Before working on the electrical panel of the appliance, make sure that power supply is off.

1. Cut a length of cable long enough to allow installing it without kinking.
2. On one end of the cable, remove the jacket for a length of approximately 70-80 mm, taking care not to cut the shielding (metal mesh and/or aluminium sheet and, if present, the bare connector in touch with the shield) and the wires contained within.
3. If the cable is too thin to be held in place in the cable holding bracket (detail C in Figure 6.8 CAN BUS cable connection → 52), make it thicker by wrapping insulating tape around the jacket close to the stripped part (to an approximate diameter of 12-13 mm).
4. Pull back the shielding on the jacket; apply isolating tape to the end of the shielding as pulled back (detail A, Figure 6.8 CAN BUS cable connection → 52).
5. If the appliance is a **terminal node** of the network connect the three coloured wires to the orange connector as shown in detail "A" of Figure 6.9 Electrical wiring diagram → 53. Respect the correct indications L, H, GND provided in Table 6.2 CAN BUS cables type → 51, on the figure and on the electronic board below the connector.

6. If the appliance is an **intermediate node** repeat the operations from step 2 to step 5 for the other cables required (in this way you will have two cable lengths each one without the jacket on one end). Twist together the cores with the same color and connect them to the orange connector, as shown in detail "B" of Figure 6.9 Electrical wiring diagram → 53.
7. Fix the CAN BUS cable (or two cables, according to the type of node being connected) to the holding bracket in the upper part of the electrical panel so that the pulled-back shielding is in solid touch with the metal bracket. The cables must be firmly held in place by the bracket if pulled.
   In order to position the jumpers on the electronic board according to the type of node being configured:

- If the appliance is a **terminal node** on the network (i.e. 3 wires are inserted in the orange connector on the board): set the jumpers as shown in detail "A" of Figure 6.9 Electrical wiring diagram → 53:
- If the appliance is an **intermediate node** on the network (i.e. 6 wires are inserted in the orange connector on the board); set the jumpers as shown in detail "B" of Figure 6.9 Electrical wiring diagram → 53:

8. After finished with all the above operations, close the electrical panel and refit the front panel of the appliance.

How to connect the CAN BUS cable to the DDC

The CAN bus cable is connected to the specific orange connector (P8) supplied with the DDC in a bag.

Before working on the DDC, make sure that it is off.

The DDC, like the controller on the appliance, has jumpers that must be moved so that it can be configured as an intermediate or terminal node. The position of the jumpers on a new DDC is CLOSED.

To connect the CAN bus cable to a DDC

You will need: DDC not powered up.

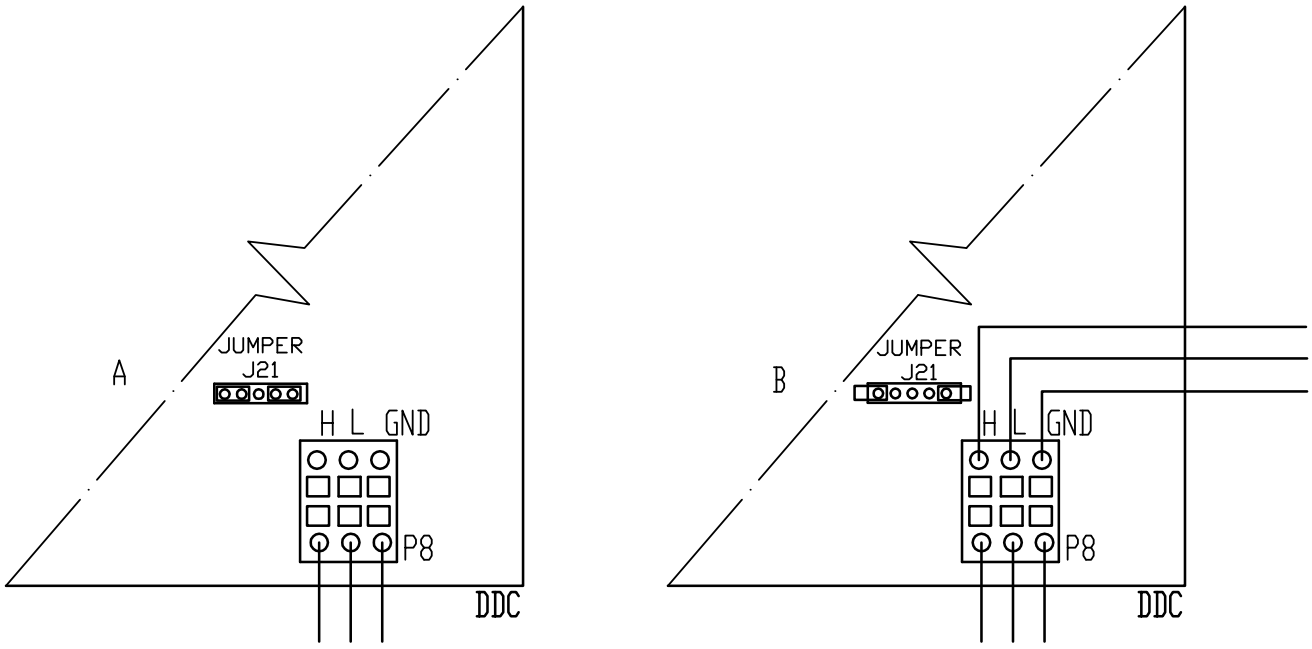
1. Depending on the type of node being configured, set the DDC's jumpers J21 as shown in detail "A" or detail "B" in Figure 6.16 detail wires and jumpers J21 - terminal/intermediate node CCI/DDC → 63. If necessary, open the DDC's back panel (4 screws); after jumpers J21 have been correctly positioned, close the cover again and retighten the 4 screws.

- If the DDC is an **intermediate node** on the network (with no. 6 wires in the orange connector "P8"): set the jumpers "J21" as shown in detail "B" of Figure 6.16 detail wires and jumpers J21 - terminal/intermediate node CCI/DDC → 63: Jumpers OPEN.
- If the DDC is an **terminal node** on the network (with no. 3 wires in the orange connector "P8"): set the jumpers "J21" as shown in detail "A" of Figure 6.16 detail wires and jumpers J21 - terminal/intermediate node CCI/DDC → 63: Jumpers CLOSED.

2. Prepare the orange CAN bus connector, from the supplied sleeve.
3. Cut a length of cable long enough to allow installing it without kinking.
4. Remove the sheath for a length of approximately 70-80 mm, taking care not to cut the shielding (metallic shield and/or aluminium sheet and, if present, the bare connector in contact with the shield) and wires contained inside.

5. Roll the shielding and connect it to a 4-mm eyelet terminal, as illustrated in Figure 6.10 Connection from CAN BUS to connector P8 → 55, details C and D. Now proceed as follows:
6. If the DDC is an **terminal node** connect the three coloured wires to the orange connector "P8", following the diagram provided in detail "A" of Figure 6.16 detail wires and jumpers J21 - terminal/intermediate node CCI/DDC → 63. Observe the terminal markings L, H, GND (on the DDC at the base of the socket "P8") which are given both in Table 6.2 CAN BUS cables type → 51 and in the example.
7. If the DDC is an **intermediate node** repeat the operations from step 2 to step 4 for the other length of CAN bus cable required. Connect the six coloured wires to the orange connector "P8", following the diagram provided in detail "B" of Figure 6.16 detail wires and jumpers J21 - terminal/intermediate node CCI/DDC → 63. Observe the terminal markings L, H, GND (on the DDC at the base of the socket "P8") which are given both in Table 6.2 CAN BUS cables type → 51 and in the example.
8. Insert the orange connector ("P8") with the wires first into the opening prepared in the cover of the DDC, and then into the appropriate socket on the DDC itself, making sure it is correctly inserted.
9. Use the rear cover bolts located near the CAN BUS socket to secure the 4 mm eyelet (or 2 eyelets) (detail D, Figure 6.10 Connection from CAN BUS to connector P8 → 55). The cable should be secured against pulling out.

Figure 6.16 – detail wires and jumpers J21 - terminal/intermediate node CCI/DDC



LEGEND

DDC	CCI/DDC
J21	Jumper CAN-BUS in CCI/DDC board
A	detail case "terminal node" (3 wires; J21=jumper "closed")
B	detail case "intermediate node" (6 wires; J21=jumper "open")
H,L,GND	data signal wires

Detail terminal and intermediate node: jumpers position J21: "closed" - "open".

How to connect the DDC

The DDC requires a low voltage power supply (24 V) with a 230/24 V AC, 50 Hz safety transformer; the minimum power requirement is 20 VA. For the connection use a cable with the minimum specifications 2 x 0.75 mm^2.

Connect the DDC to the transformer via the 4-pole connector provide for this, following the diagram in Figure 6.17 CCI/DDC - electric supply → 64. Pass the cable through the opening in the cover before fixing the wires to the connector.
To power up the DDC, proceed as follows.

You will need: the appliance disconnected from the electricity supply

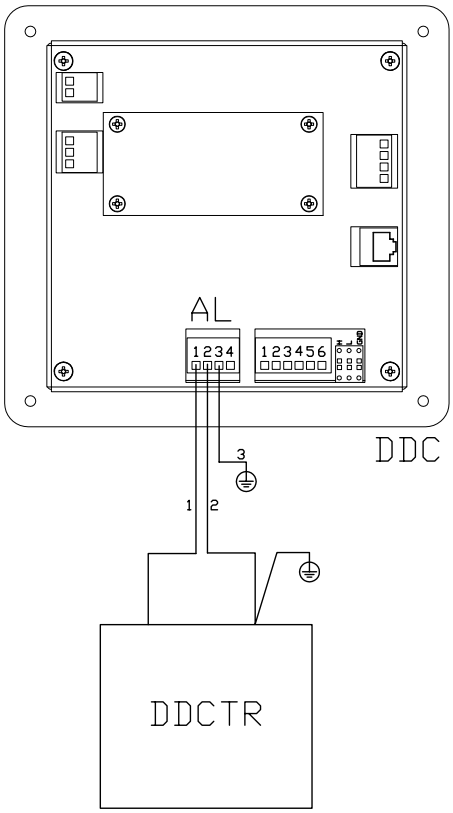
1. Remove the DDC's back panel by undoing the 4 bolts securing it.
2. Cut a suitable length of power cord (minimum 2x0.75 mm^2).
3. Pass the power cord (DDC side) through the hole in the DDC's cover and hook up as shown in the example, with the following polarities: terminal 1 = 24 V; terminal 2 = 0 V; terminal 3 = ground.

Make the grounding connection on the transformer terminal connected to terminal 2 of the 4-pole connector (EP) of the DDC. Terminal 2 is connected internally to terminal 3, and is thus grounded; if the transformer already has one wire grounded, it must be connected to this terminal. Terminal 3 of the DDC's 4 pole connector must always be grounded (r ≤ 0.1Ω).

4. On completion, close the DDC's back panel with the 4 bolts.

The DDC is equipped with a backup battery which retains the memory settings in case of power failure. **The backup battery lasts approximately 7 years**, after which time it must be replaced by an authorised Robur Technical Assistance Centre.

Figure 6.17 – CCI/DDC - electric supply



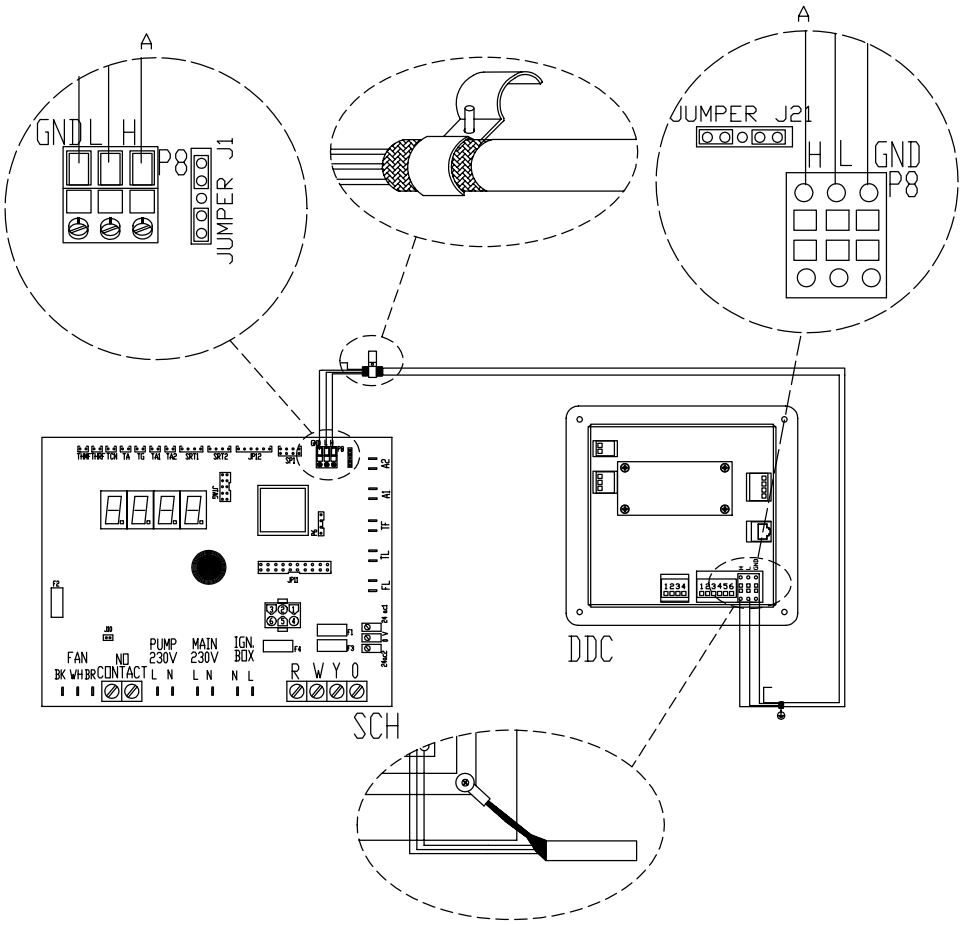
LEGEND

DDC	CCI/DDC
AL	supply 4 poles connector
1	clamp and wire for 24 Vac supply
2	clamp and wire for 0 Vac supply
3	clamp and wire for ground contact (required connection)
DDCTR	safety transformer
- (230/24 Vac	50/60 Hz)

CCI/DDC electric supply from external transformer.

The following wiring diagrams show the connection of the DDC to 1 appliance (Figure 6.18 Connexion câble CAN BUS for plants with one unit → 65) and 2 appliances (Figure 6.19 Connexion câble CAN BUS for plants with more unit → 66) respectively.

Figure 6.18 – Connexion câble CAN BUS for plants with one unit

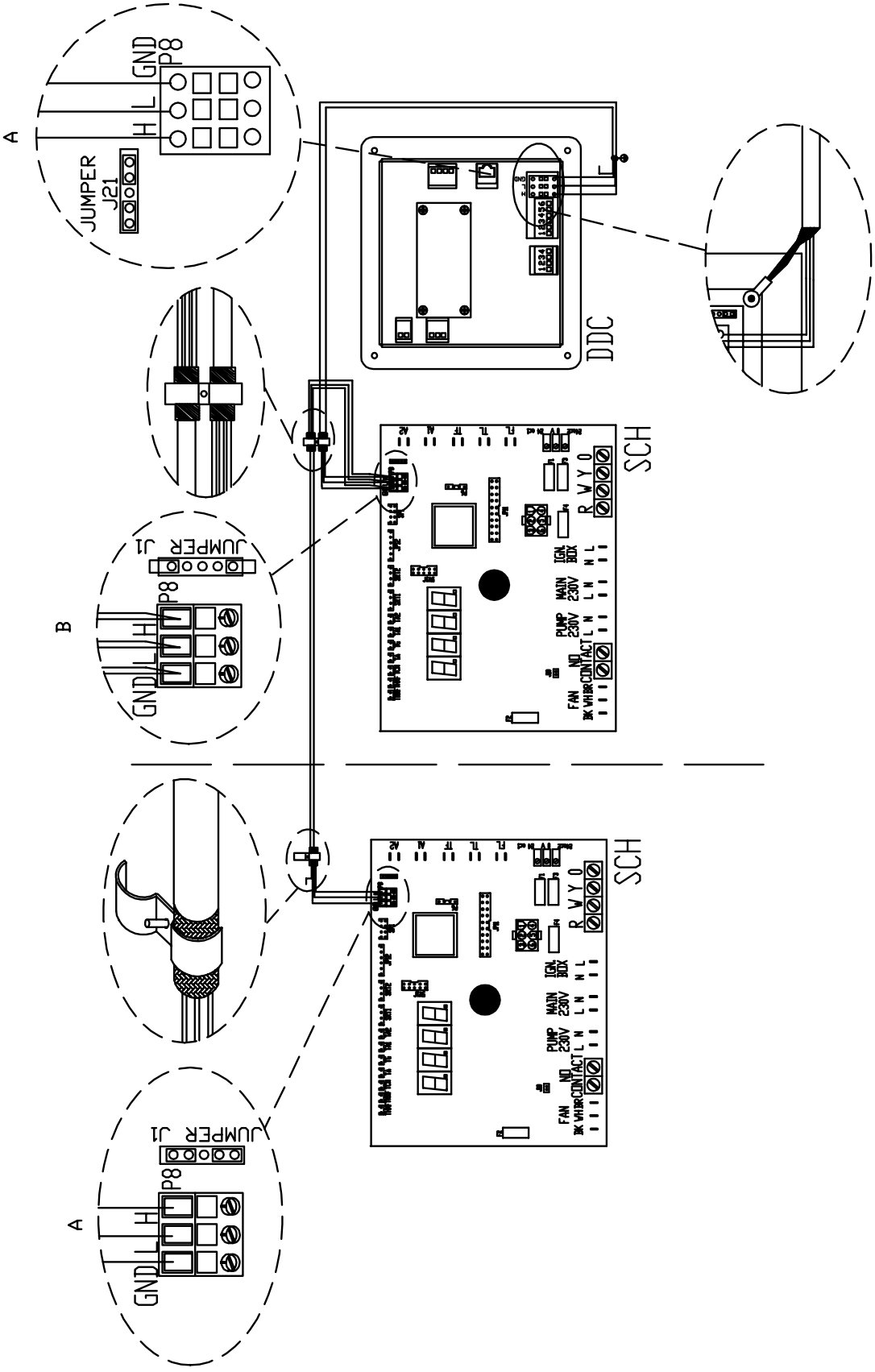


LEGEND

DDC	direct digital control
SCH	electronic board S61
J1	Jumper CAN-BUS in board S61
J21	Jumper CAN-BUS in board DDC
A	terminal nodes connection - (3 wires; J1 e J21 = "closed")
H,L,GND	data signal wires (rif. cables table)

Connexion câble CAN BUS between one DDC and one unit

Figure 6.19 – Connexion câble CAN BUS for plants with more unit



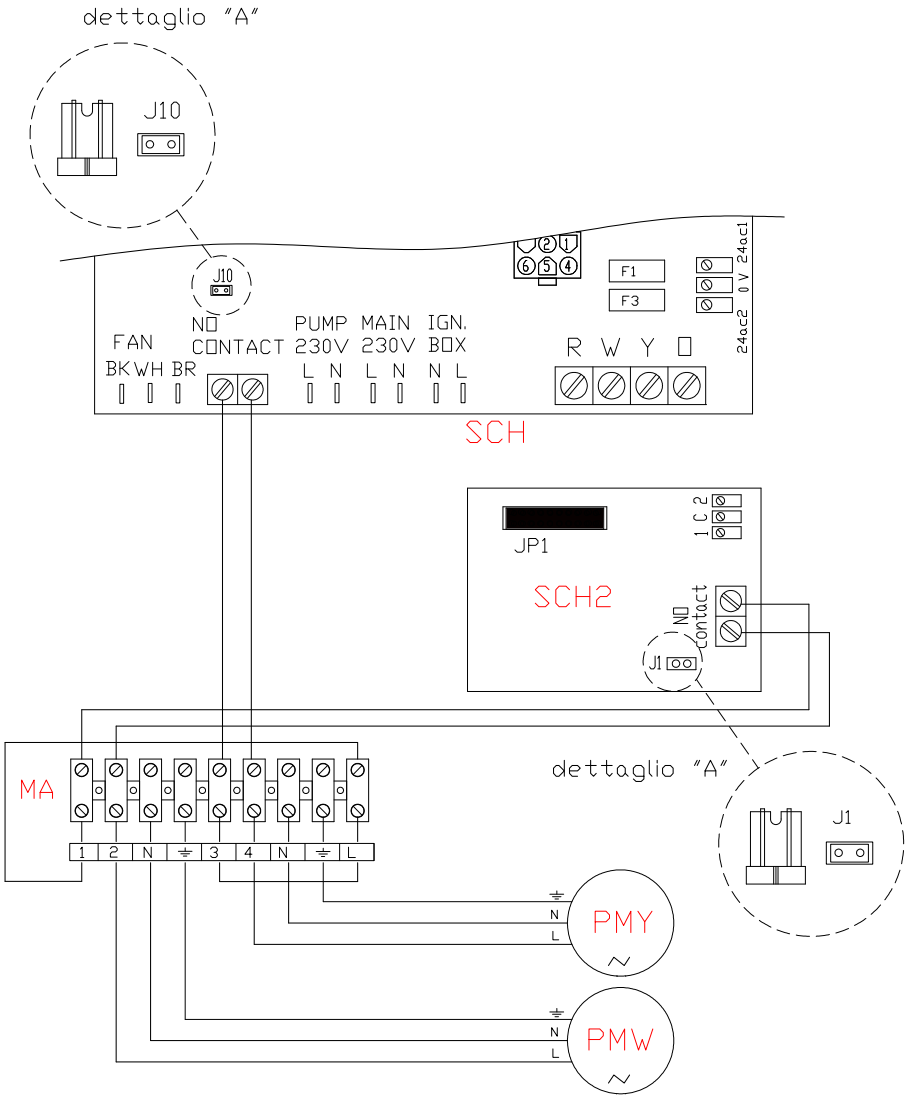
Connexion câble CAN BUS between one DDC and more unit

How to connect the system water circulation pumps

Control of the plant water circulation pump from the appliance's controller depends on the power rating of the pump itself. 2 cases may be distinguished:

- Direct control from the controller with power absorbed by the pump less than 700 W. If the power absorbed by the pump is less than 700 W, make the connection as shown in Figure 6.20 Electrical wiring diagram → 67 and check that the jumper J10 and J1 are CLOSED, as shown in detail A.
- Direct control from the controller with power absorbed by the pump of more than 700 W. If the power absorbed by the pump is more than or equal to 700 W, make the connection as shown in Figure 6.21 Electrical wiring diagram → 68 using a control relay. In this case it is necessary to OPEN the jumper J1 and J10 positioning its as shown in detail A and B of the Figure.

Figure 6.20 – Electrical wiring diagram

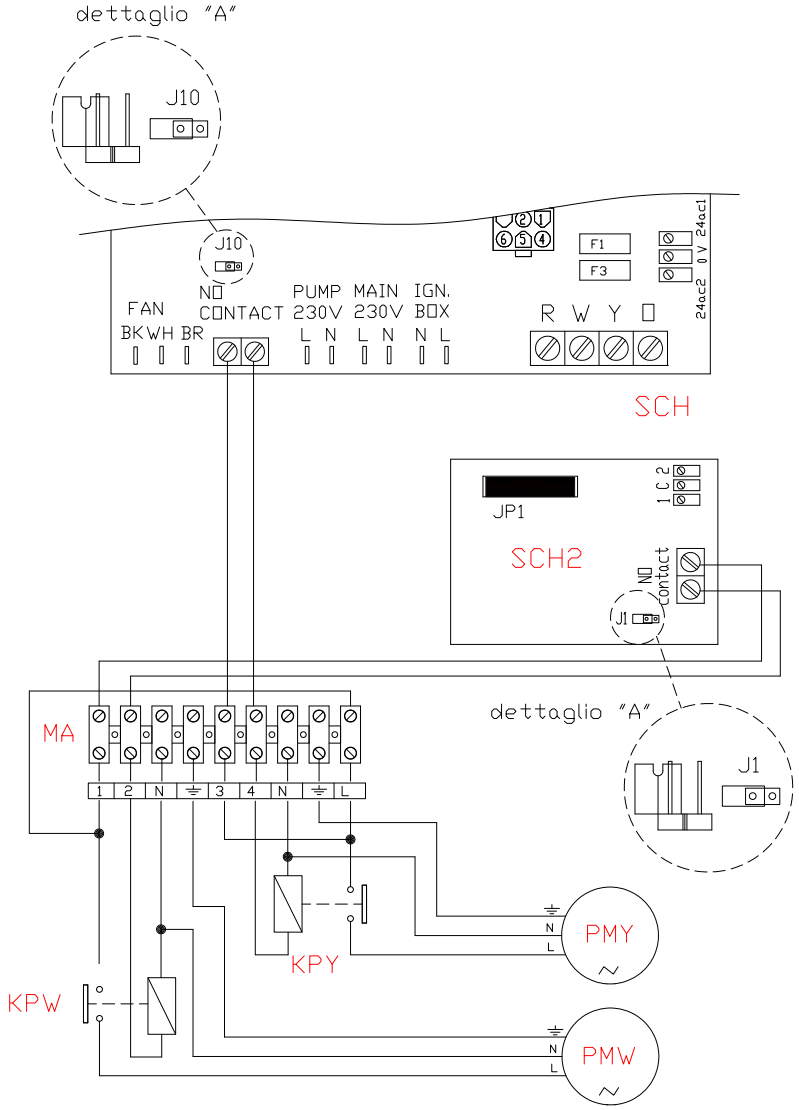


LEGEND

SCH	electronic board
SCH2	electronic board
J10	J1 - jumper closed
N.O. CONTACT	clean exit normally open
MA	Unit terminal block
L	phase
N	neutral
Components NOT SUPPLIED	
PMW	Hot side water pump <700W
PMY	Cold side water pump <700W

Connection of plant water circulation pumps (power absorption less than 700W), controlled directly by the appliance.

Figure 6.21 – Electrical wiring diagram



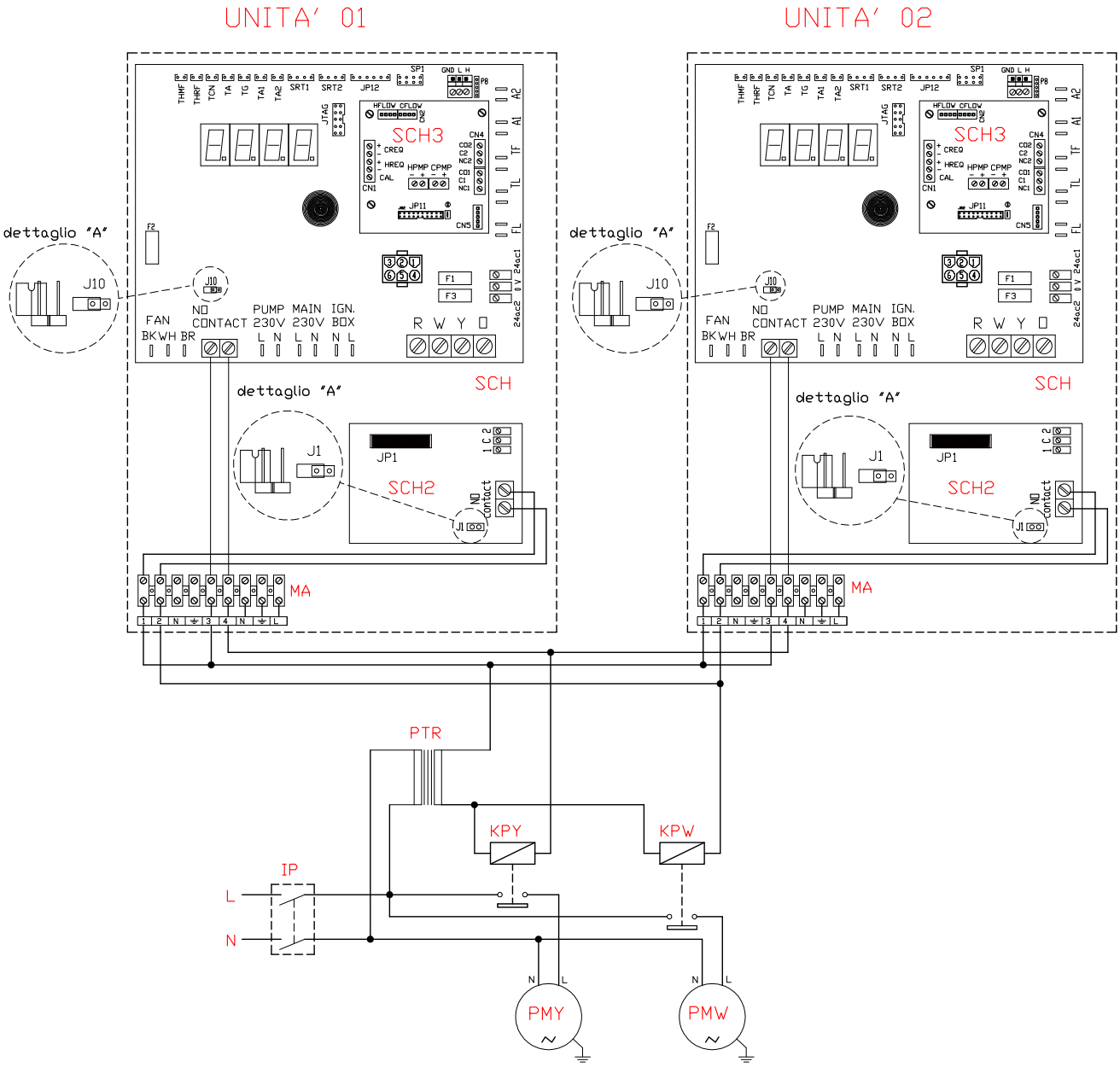
LEGEND

SCH	electronic board
SCH2	electronic board
J10	J1 - jumper open
N.O. CONTACT	clean exit normally open
MA	Unit terminal block
L	phase
N	neutral
Components NOT SUPPLIED	
PMW	Hot side water pump ≥700W
PMY	Cold side water pump ≥700W
KPW	Hot side pump control relay
KPY	Cold side pump control relay

Connection of plant water circulation pumps (power absorption equal or more than 700W), controlled directly by the appliance.

If several appliances are connected on the same hydraulic circuit, it is always necessary to provide a safety transformer (secondary SELV) and a respective control relay; make the connections according to the diagram in Figure 6.22 Electrical wiring diagram → 69.

Figure 6.22 – Electrical wiring diagram



LEGEND

SCH	electronic board
SCH2	W10 electronic board
SCH3	MOD10 electronic board
J1	J10 - jumper open
N.O. CONTACT	clean exit normally open
MA	Unit terminal block
L	phase
N	neutral

Components NOT SUPPLIED

PMW	Hot side water pump
PMY	Cold side water pump
KPW	Hot side pump control relay
KPY	Cold side pump control relay
PTR	SELV safety transformer
IP	bipolar pump switch

Example of pump/appliance electrical connection with 230 Vac pump, controlled directly by the appliance through a relay and a SELV safety transformer

Variable flow pumps WILO STRATOS PARA can also be used (see Section 8 ACCESSORIES → 81). In this case, for the electrical wiring of the pumps, please refer to Figure 6.14 Wiring diagram for connection of Wilo variable rate pumps → 59 and the relevant paragraph.

The primary circulation pump/s must be controlled by the S61 board, or directly (via "N.O. contact" contacts or 0-10V signal) or indirectly ("OR" use of said contacts by BMS type external systems). Otherwise, the primary circulation pump/s must be running permanently.

6.5 TYPE C (CONSENT SWITCH)

Before making the electrical connections, make sure that work is not carried out on live elements.

General indications

- Check that the power supply voltage is 230 V 1N - 50 Hz power.
- Make the electrical connections as given in the following wiring diagrams.
- Make the electrical connection in such a way that the ground wire is longer than the live wires. In this way it will be the last wire to be pulled away if the mains cable should accidentally be pulled, and will thus guarantee the ground connection.

Electrical safety is ensured only when the appliance is correctly connected to an efficient grounding system, realized according to current safety regulations. Do not use gas pipes as grounding.

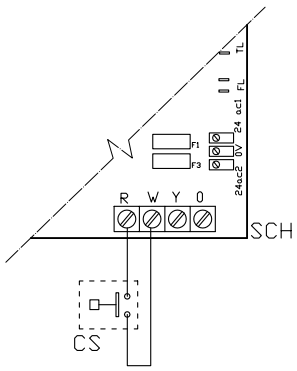
How to connect the consent switch

You will need: the appliance is not powered electrically (external master power switch set to OFF)

1. Connect the permissive (on-off switch or ambient thermostat or timer, etc.) to terminals **R** and **W** on the appliance's electronic board as shown in Figure 6.23 Electrical wiring diagram → 70 (detail "CS").

For the appliance to operate correctly, it is ALWAYS necessary to provide a consent switch. Do not use the general mains external circuit breaker («GS») to switch the appliance on or off.

Figure 6.23 – Electrical wiring diagram



LEGEND

SCH	Electronic board
R	Common
W	Terminal consensus warming
Components NOT SUPPLIED	
CS	ON/OFF command switch

electrical connections of ON/OFF command switch

How to connect the system water circulation pumps

For how to connect the system pumps, see the section with this title in Paragraph 6.4 TYPE B (DDC) → 60.

Variable flow pumps WILO STRATOS PARA can also be used (see Section 8 ACCESSORIES → 81). In this case, for the electrical wiring of the pumps, please refer to Figure 6.14 Wiring diagram for connection of Wilo variable rate pumps → 59 and the relevant paragraph.

6.6 HOW TO RESET THE FLAME CONTROLLER FROM REMOTE

The flame controller reset can be controlled remotely by installing a button (not supplied) to the flame controller inside the unit's electrical panel.
Connect the button as instructed below.

You will need: the appliance disconnected from the electricity supply

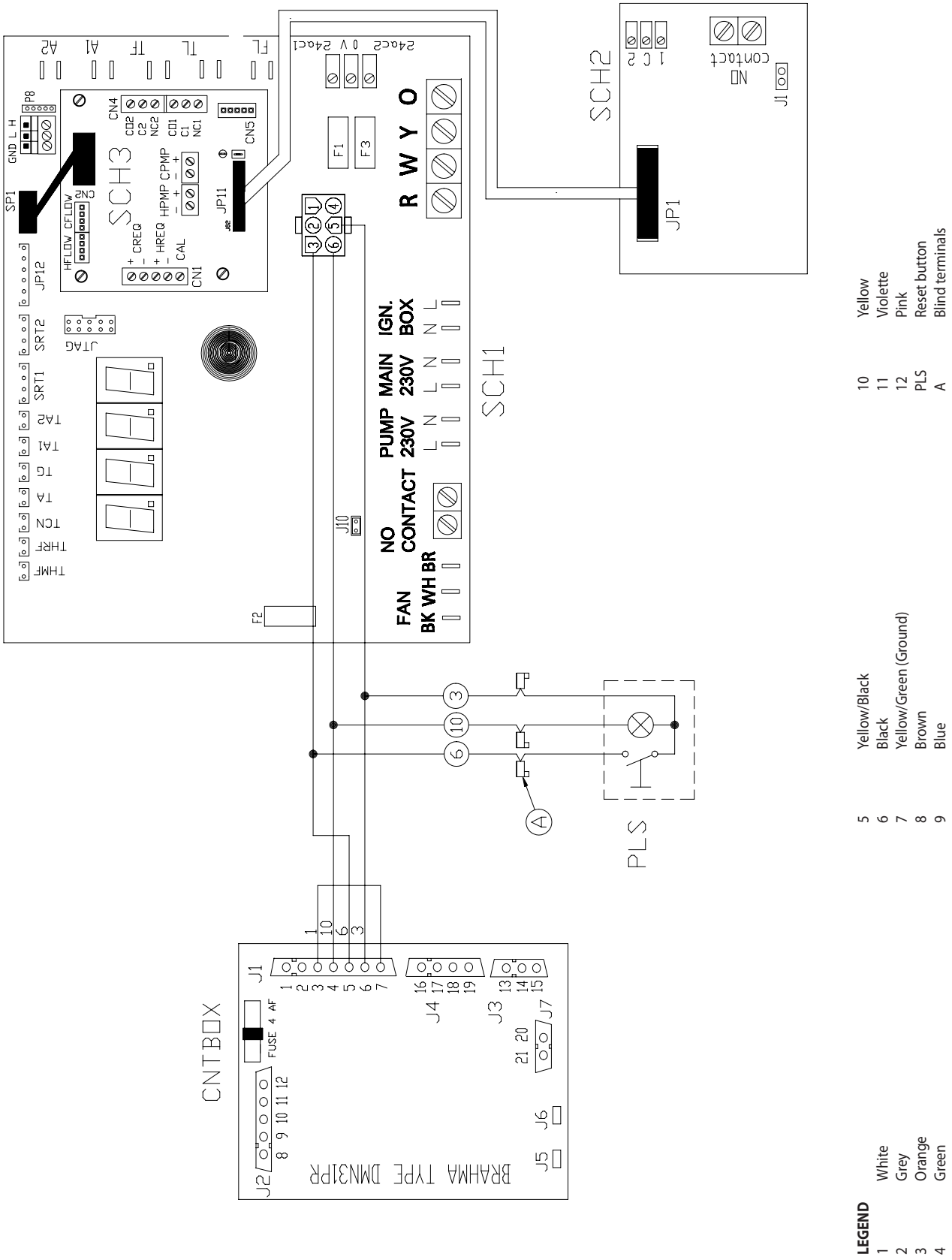
1. The cable required to connect the reset button must be 3x0.75mm^2.
2. Cut a suitable length of cable.
3. Connect the cable to the blind terminals A (see Figure 6.24 Button connection for flame controller reset → 72).

The blind terminals are hidden on the rightinside the cable tray. To extract them, remove the cover of the tray, slide the cables out of the provided slots, and carefully close the tray again.

The cable may not be longer than 20 metres.

Incorrect wiring of the reset button may damage the component irreparably. Check the cabling carefully before powering the unit.

Figure 6.24 – Button connection for flame controller reset



7 INITIAL ACTIVATION AND MAINTENANCE

In this section you will find the following information:

- Indications required by the authorized Robur Technical Assistance Centre (TAC) in order to carry out the entire procedure of first start-up of the appliance.
- Indications regarding maintenance operations of the appliance.

At the end of the section you will find instructions for changing the type of gas.
Before proceeding with the operations described in this section, the installer is invited to read Paragraph 3.1 GENERAL INFORMATION → 8. Please refer to Paragraph 4.1 START UP (AND SHUT DOWN) → 17 for switching the appliance on and off.

If the appliance is connected to a CCP for the appliance start-up and switch-off control phases, reference must be made to the two CCP files dedicated to it.

If the appliance is connected to a DDC (and the DDC is in controller mode), for the phases of activation and deactivation of the appliance it is necessary to refer to the two manuals dedicated to the DDC itself.

7.1 PROCEDURE FOR FIRST START UP

The entire procedure for the initial activation of the appliance must only carried out by an authorised Robur Technical Assistance Centre (TAC). The product's guarantee may be void if the procedure is not carried out by a Robur TAC.
Before leaving the factory, the appliance has been thoroughly tested.
The entire procedure for initial activation of the appliance consists in carrying out the following (main) operating stages:

1. preliminary verification of plant compliance;
2. check/setup of the combustion parameters;
3. regulating the plant operating parameters.

Preliminary checks of the installation compliance

The authorized technician must:

- Check that the whole installation has been realized in accordance with its design, following the manufacturer's instructions and respecting current legislation. The design must have been drawn up by a professional specifier.
- Check that all the connections (hydraulic, gas and electrical) of the appliance have been made correctly.
- Check that the installation is actually compliant as per the Declaration of Conformity provided by the installer to the owner.

The Declaration of Conformity CERTIFIES that the installation is compliant with current regulations. This Declaration is a **mandatory** document and as such it must be provided by the installer to the owner.

- Check that the water pressure and flow in the hydraulic circuit and the dynamic gas mains pressure are correct, as indicated by the manufacturer.
- Check that the electrical power supply is 230V 50Hz
- Check that the air/fumes pipes are properly connected to the exterior.
- Check that the fumes condensate discharge is properly installed.
- Check that the safety clearances given in Figure 5.2 Clearances → 28 have been observed.

If all the conditions listed above are in place, the authorized technician can proceed with the commissioning and start up of the appliance.

If any non-compliance is found during the preliminary checks, the authorized technician may choose not to proceed with the "first start up".
In this case, the authorized technician must:

- Report the user/installer of any installation anomaly.
- Report the user/installer of any situation that is potentially hazardous for the appliance and for people.
- Report of any missing documentation relevant to the installation.
- According to the reports made, advise any corrective action to be taken at the installer's care in order to proceed with the "first start up".

It is the responsibility of the user/installation technician to carry out any corrective measures on the plant indicated by the authorized technician. After such corrective measures have been completed, the authorized technician will assess the plant again. At this point, if safety and compliance conditions are judged satisfactory, the authorized technician must carry out the "first start up".

Plant conditions that are hazardous for people or for the appliance. If any of the following hazardous situations arises, the authorized technician must not carry out the "first start up":

- appliance installed outdoors inadequately protected against the weather;
- appliance installed close to combustible substances or surfaces or in any case in conditions of bad accessibility or not allowing safe maintenance operations;
- control of switching on and off of the appliance not via the CCP/DDC or consent switch but via the master power switch;
- damages or failures of the appliance due to transportation or installation;
- smell of gas due to probable leaks from the plant itself and in any case all situations that are due to non-compliant plants, considered potentially hazardous.

Plant anomalies. If any of the following situations exists, the authorized technician may carry out the "first start up" at his choice, but the appliance must be left off until the anomalies are removed:

- installations (not potentially hazardous) not carried out according to sound workmanship practices, installations (not potentially hazardous) not complying with current national and local regulations;
- installations (not potentially hazardous) not carried out according to good workmanship practices, not complying with the instructions provided by the manufacturer;
- installations that can cause operational troubles on the appliance.

Procedure for checking/setting-up the combustion parameters

During the initial activation procedure, the combustion parameters must be checked and set ONLY by a Robur TAC. In this stage, NEITHER the user NOR the installation technician is authorised to perform such operations, and in so doing may invalidate the guarantee of the appliance.

The appliance is supplied with all of its units already regulated for the type of gas for which the appliance itself is set up.

The type of gas for which the appliance is set up can be identified from the adhesive label located on the unit's internal gas pipe (detail M, Figure 7.2 Gas changeover → 80).

The nozzles required to change the gas type to G30 and G31 are supplied together with the appliance.

During the first start-up procedure it is in any case necessary to:

- check the dynamic gas mains pressure
- check and adjust the appliance's combustion parameters

You will need: the appliance connected to the gas and electricity supply: switched off and with the gas cock closed; front panel removed.

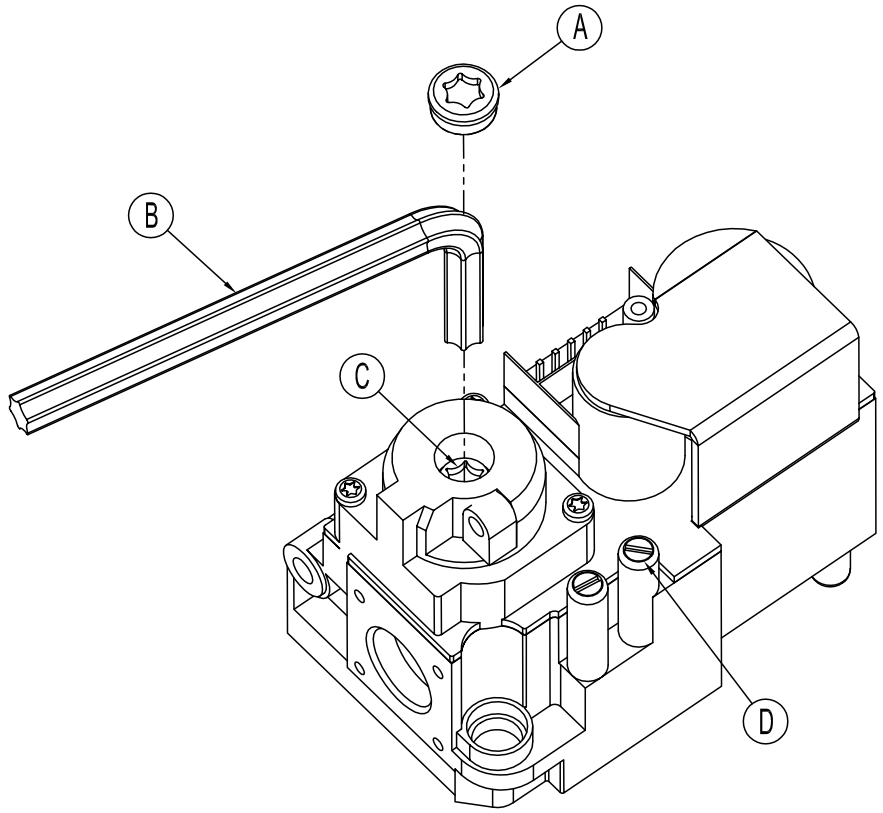
Check the dynamic gas mains pressure

1. Connect the manometer to the gas intake (see detail D, Figure 7.1 Gas valve → 75).
2. Open the gas valve and check that the grid static pressure complies to the value reported in Table 5.2 Network gas pressure → 31 (with a tolerance of ±15%).

If the static mains pressure is greater than 50 mbar DO NOT switch on the appliance!

3. Give the consent signal for operation.
4. After some seconds of operation, check that the grid dynamic pressure complies with the value reported in Table 5.2 Network gas pressure → 31 (with a tolerance of ±15%).

Figure 7.1 – Gas valve



LEGEND

A	Plug
B	Key Torx TX40
C	screw adjustment CO2
D	gas pressure intake

Gas valve Honeywell VK 4115V

If the pressure measured by the pressure gage is not complying with the value reported in Table 5.2 Network gas pressure → 31 (with a tolerance of ±15%), it is NOT possible to switch the appliance on!

5. Proceed with the regulation/verification of the combustion parameters as stated in the next paragraph.

Checking and adjusting the combustion parameters

After having checked the dynamic mains pressure (see section), you may check and adjust the combustion parameters as follows.

1. Fit a combustion products probe in one of the points provided for this purpose on the external fumes equipment or at point L in Figure 7.2 Gas changeover → 80
2. Give the unit functioning consent and wait for at least 5 minutes for normal combustion conditions.
3. With the appliance running, access menu 2 parameter 4 of the unit's controller: the display will flash "P_H0", press to confirm forcing maximum thermal power.
4. Check that the value of CO_2 read on the flue gas analyser coincides with the value given in Table 7.3 Gas nozzles and content of CO2 → 79 at the "Content of CO_2 with/MAX modulation" line with +0.2 -0.4 tolerance.
   Example (G20 gas): the nominal content of CO_2 is equal to 9.1%, values in the range between 8.7-9.3% are therefore acceptable.
5. Access menu 2 parameter 3 of the unit's controller inside the electric panel: the display will flash "P_L0", press to confirm forcing minimum thermal power.
6. Now check that the difference between the value read in point 4 and that now displayed on the flue gas analyser, corresponds to the data given in the Table 7.3 Gas nozzles and content of CO2 → 79 at the "Delta CO_2 between MAX and MIN potentiality" line with tolerance of +0.3-0.0.
   Example (G20 gas): if at point 4 a content of CO_2 equal to 9.2% was detected, at point 6 there must be a value of (9.2%-0.4) with tolerance of +0.3 -0.0 on the delta value, i.e. a value in the range of 8.8-8.5%.
7. If this is not the case, remove cap A from the gas valve (see Figure 7.1 Gas valve → 75) and use a Torx TX40 wrench to act on screw C in Figure 7.1 Gas valve → 75. Turn clockwise to increase the percentage of CO_2 and anti-clockwise to decrease the percentage of CO_2.

1/8 turn of the regulator screw reduces (counterclockwise) or increases (clockwise) the CO_2 content by approximately 0.1%. DO NOT turn the screw more than one full turn in either direction.

8. With the appliance running, access menu 2 parameter 4 of the unit's controller: the display will flash "P_H0", press to confirm forcing maximum thermal power.
9. Check that, also following a regulation intervention on screw C, the value of CO_2 corresponds to the value read in Table 7.3 Gas nozzles and content of CO2 → 79 at the "Content of CO_2 with/Max modulation" line with tolerance of +0.2 -0.4.

If you cannot calibrate the CO_2 percentage after the second attempt, DO NOT activate the appliance; contact Robur technical service at +39 035/888111.

10. If the check/setup of the combustion parameters has been successful, please enter menu 2, parameter 5, of the electronic board inside the electric box of the appliance: on the display, the message "unF0", will blink; press to remove the operational override previously selected and then return to the normal operational configuration with modulation of the thermal power.

After 30 minutes of operation the appliance automatically cancels the preceding forced power mode. To anticipate this timing, select and execute action "5" in menu 2.

11. Switch the appliance off.
12. Close the gas valve.
13. Reinstall the cap A in Figure 7.1 Gas valve → 75.
14. Reinstall the front panel.

7.2 MAINTENANCE

Correct maintenance prevents problems, guarantees maximum operating efficiency of the appliance and allows running costs to be contained.

The maintenance operations described in this paragraph must be performed exclusively by the serviceman in charge of the plant or by an authorized CAT Robur.

Any operation that regards internal components of units of the appliance must be carried out by an authorized Robur Technical Assistance Centre (TAC), according to the instructions supplied by the manufacturer.

The "efficiency check" and every other "check and maintenance operation" (see Table 7.1 → 78 and 7.2 → 78), **must be performed with a frequency in agreement to current law** or, if more restrictive, in respect of what requested by the planner (builder of the system) or by the manufacturer of the unit.

The liability of CHECKING THE EFFICIENCY AS A FUNCTION OF THE SYSTEM, OF THE FUEL IN USE AND OF THE THERMAL POWER, to be carried out with the purpose of containing the energy consumption, **is in charge to the responsable of the system**.

Before any maintenance operation, switch off the appliance by means of the permissive contacts (or by means of DDC/CCP) and wait for the completion of the shut-down cycle. When the appliance is off, switch off power supply and gas supply (according to anti-icing settings), opening the electrical breaker and closing the gas isolation valve.

GUIDELINES FOR THE PREVENTIVE MAINTENACE OPERATIONS

In Table 7.1 → 78 are reported the **guidelines** for the preventive maintenance operations.

If the unit is subject to particularly heavy duty (for example in process plants or in other conditions of continuous operation), **these maintenance operations must be more frequent**.

Table 7.1

GUIDELINES FOR THE PREVENTIVE MAINTENACE OPERATIONS					
Check of the unit	**GAHP-A**	**GAHP-GS/WS**	**AY**	**ACF**	**GAHP-AR**
Visually check of the general condition of the unit and of its air heat exchanger. (1)	√		√	√	√
Check the correct operation of the device used for monitoring the water flow	√	√	√	√	√
Check the % value of CO_2	√	√	√		
check gas pressure to the burners				√	√
Check that the condensate discharge is clean (clear the condensate discharge hole of any blockages) [If necessary, frequency of the maintenace operation must be increased]	√	√	√		
Replace the belts after 6 years or 12,000 hours of operation	√	√		√	√
Check/restore the pressure of the primary hydronic circuit			√		
Check/restore the air pressure inside of the expansion vessel of the primary hydronic circuit			√		
Check every CCI or DDC(2)	**DDC o CCI**				
Check that the plant is able to achive the setpoint temperature	√				
Download the hystorical events	√				

1 It is suggested the cleaning of the air heat exchanger once every 4 years [the optimal frequency of this operation is in any case a consequence of the installation site].
2 Check that the plant is able to achive the setpoint temperature.

ORDINARY SCHEDULED MAINTENANCE

Perform the following operations at least **once every 2 years**.

If the unit is subject to particularly heavy duty (for example in process plants or in other conditions of continuous operation), **these maintenance operations must be more frequent**.

Table 7.2

SCHEDULED MAINTENANCE OPERATIONS	TO BE PERFORMED AT LEAST ONE EVERY TWO YEARS				
Check of the unit	**GAHP-A**	**GAHP-GS/WS**	**AY**	**ACF**	**GAHP-AR**
Clean the combustion chamber	√	√	√	√	√
Clean the burner	√	√	√	√	√
Clean the electrodes of ignition and flame sensing	√	√	√	√	√
Check that the condensate discharge is clean (clear the condensate discharge hole of any blockages)	√	√	√		
Replace the silicone gasket			√		

In Section 5 HYDRAULIC INSTALLATION → 26 are reported **suggestions related to the hydraulic plant**.

7.3 CHANGE OF GAS TYPE

This operation must be carried out exclusively by an authorised Robur Technical Assistance Centre (TAC).

If the appliance is to be used with a type of gas other than that indicated on the the adhesive label located on the unit's electric panel, switch off the appliance, shut off its power and gas supplies and proceed as follows (see Figure 7.2 Gas changeover → 80):

You will need: the appliance switched off and disconnected from the gas/electricity supplies

1. Disconnect the gas pipe from the gas valve.
2. Undo the 4 bolts E shown in Figure 7.2 Gas changeover → 80 and remove the gas valve/blower assembly from the burner.
3. Protect the burner from bolts and nuts falling into it.
4. Using a CH 4 hex key, undo the 4 bolts G indicated in Figure 7.2 Gas changeover → 80 and remove the nozzle D from the gas valve.

5. Replace the nozzle and o-ring B (see Figure 7.2 Gas changeover → 80) with those of the diameter suited to the new type of gas (see Table 7.3 Gas nozzles and content of CO2 → 79). The nozzle code is stamped on the nozzle itself.
6. Check that the o-ring C is fitted (see Figure 7.2 Gas changeover → 80).
7. Reassemble the gas valve to the blower with the 4 bolts G taking care that the red silicon hose between the venturi tube and the gas valve (see detail F of Figure 7.2 Gas changeover → 80) is correctly installed.
8. Replace the white gasket between the blower and the burner.
9. Reinstall the blower/gas valve assembly to the burner with the 4 bolts E, taking care not to damage the white gasket.
10. Reconnect the gas pipe to the gas valve.
11. Replace the sticker indicating the type of gas for which the appliance was set up with one that indicates the new type of gas used.
12. Check the tightness of the installation as follows:

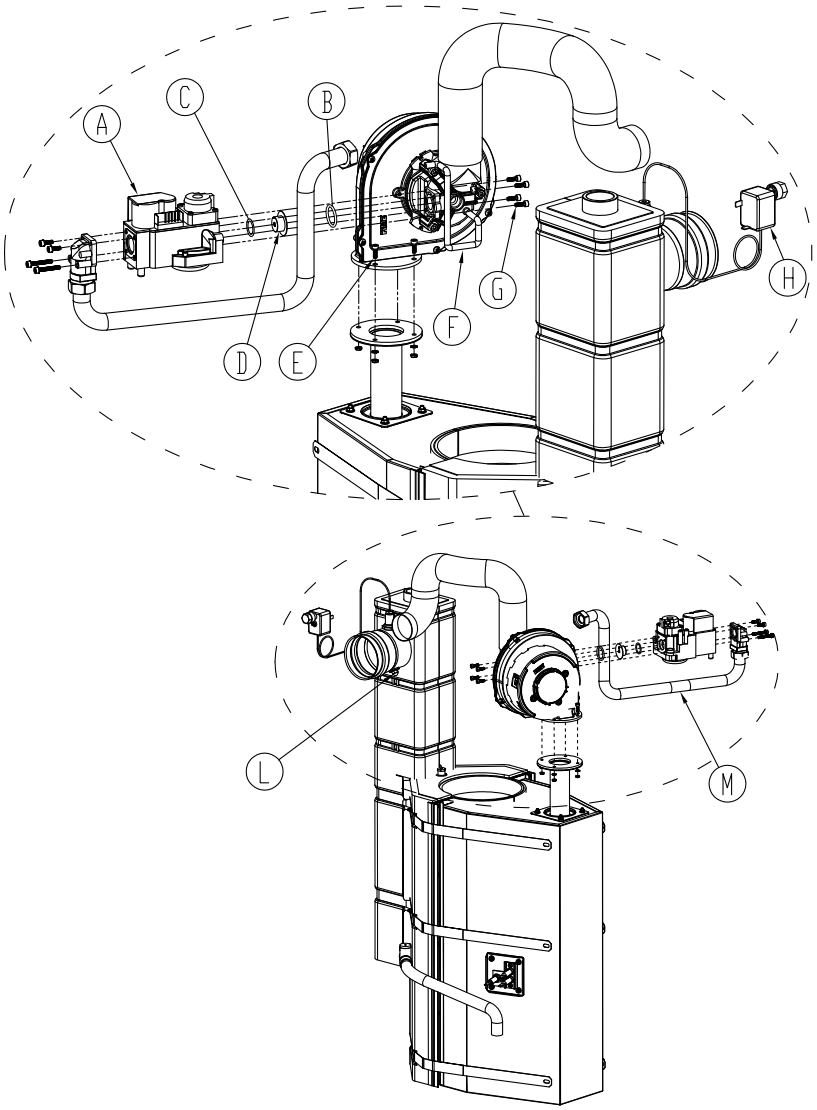
- Connect a manometer to the gas intake D (Figure 7.1 Gas valve → 75).
- Open the gas valve.
- Close the gas cock and check that the mains pressure has not dropped.

13. If there is no gas leak, supply gas and electricity to the appliance and restart it.
14. complete the change of gas type by checking that all gas connections are sealed, including those not directly affected by this operation (using soapy water or another suitable method).
15. Now check and adjust the combustion parameters as indicated in the respective paragraph.

Table 7.3 – Gas nozzles and content of CO2

Gas type	G20	G25	G25.1	G27	G2.350	G30	G31
Nozzle code	180	181	181	187	184	182	183
Nozzle diameter	4,7	5,2	5,2	5,4	5,9	3,4	3,6
Content CO2 with MAX modulation	9,1%	9,2%	10,1%	9,0%	9,0%	10,4%	9,8%
Delta CO2 between Max and Min potential	0,4	0,6	0,8	0,5	0,5	0,5	0,4

Figure 7.2 – Gas changeover



LEGEND

A	Gas valve
B	O-ring
C	O-ring
D	Gas nozzle
E	Mounting holes
F	Red silicon hose
G	Mounting holes
H	Manual reset fumes thermostat
L	Fumes outlet

Gas changeover

8 ACCESSORIES

This section contains a list of the accessories that are available for the installation and use of the appliance. To order these accessories, contact Robur S.p.A. on +39 035.888111.

Table 8.1 – Accessories

ACCESSORIES			
Name	**Description**	**Code**	**Notes**
CIRCULATION PUMPS	Wilo-Stratos Para 25-11.	O-PMP004	Variable rate pump for cold and hot water.
	Pompa Wilo-Stratos Para 30-12	O-PMP008	Max variable flow pump.
FILTERS	Sludge filter 1" 1/4	O-FLT014	
	Sludge filter 1" 1/2	O-FLT015	
	Air separator filter 1" 1/4	O-FLT010	
	Air separator filter 1" 1/2	O-FLT016	
BOILERS AND HYDRAULIC SEPARATORS	Sanitary water boiler with oversize coil, 300 l	O-SRB004	
	Sanitary water boiler with oversize coil, 500 l	O-SRB005	
	Sanitary water boiler with oversize coil, 500 l	O-SRB006	With integral solar coil.
	Sanitary water boiler with oversize coil, 750 l	O-SRB007	With integral solar coil.
	Thermal tank, three fittings, 300 l	O-SRB000	
	Thermal tank, three fittings, 500 l	O-SRB001	
	Thermal tank, three fittings, 800 l	O-SRB002	
	Thermal tank, three fittings, 1000 l	O-SRB003	
VALVES	Flow regulator valve	O-VLV001	
	3-way valve DN20 Kvs 6.3	O-VLV004	
	3-way valve DN25 Kvs 10	O-VLV005	
	3-way valve DN32 Kvs 16	O-VLV006	
	3-way zone ball valve 1"1/4	O-VLV002	
	3-way zone ball valve 1"1/2	O-VLV003	
ANTIVIBRATION	n.4 anti-vibration mounts	O-NTV003	
REGULATOR COMPONENTS	Radio module (Siemens)	O-DSP007	
	Repeater (Siemens)	O-DSP009	
	Sender (Siemens)	O-DSP008	
	Room unit basic (Siemens)	O-DSP004	
	Room unit cooling (Siemens)	O-DSP005	
	Room unit cooling (Siemens) (radio)	O-DSP006	
	Servocontrol 230V AC for zone valves, on/off 90 sec	O-BBN000	
	Modulating servocontrol for 3-way valves 230V AC 150 sec	O-BBN001	
	Probe + sender (Siemens)	O-DSP010	
	Contact probe (Siemens)	O-SND006	
	External probe (Siemens)	O-SND003	
	Immersion probe, length 2 m	O-SND004	
	Solar sensor (Siemens)	O-SND005	
	Commissioning tool	O-DSP002	
	Communications switchboard	O-DSP003	
Robur "NETBUS" CAN BUS CABLE	Cable for data communication networks: for network connection between CCI and appliance.	O-CVO008	
Transformer	50VA trasformer	O-TRS005	

9 OPERATING CODES/TROUBLESHOOTING

9.1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING

Table 9.1 – TABLE OF OPERATING CODES generated by the S61 electronic board (firmware version 3.024)

CODES	DESCRIPTION	TRIP CONDITIONS	RESET METHOD
E 200	FAULT ON RESET CIRCUIT OF FLAME CONTROL UNIT	Fault on reset circuit of flame control unit.	Contact authorised Technical Assistance.
u 201	GENERATOR LIMIT TEMPERATURE THERMOSTAT	High temperature detected by limit thermostat on body of generator	Acknowledge the thermostat manually: reset will be automatic as soon as fault condition is over.
E 201	GENERATOR LIMIT TEMPERATURE THERMOSTAT	u_01 code active for 1 hour, or u_01 code generated 3 times in 2 hours of operation.	Contact authorised Technical Assistance.
u 202	FUMES THERMOSTAT	High temperature detected by exhaust fumes thermostat.	Acknowledge the thermostat manually: reset will be automatic as soon as fault condition is over.
E 202	FUMES THERMOSTAT	u_02 code active for 1 hour, or u_02 code generated 3 times in 2 hours of operation.	Contact authorised Technical Assistance.
u 203	COLD WATER ANTIFREEZE THERMOSTAT	Low temperature detected by cold outlet water sensor.	Reset occurs automatically when the condition that generated the code ceases, with hysteresis of 2 °C.
E 205	HIGH AMBIENT TEMPERATURE	HIGH temperature detected by ambient temperature sensor.	Reset occurs automatically when the condition that generated the code ceases.
u 206	LOW AMBIENT TEMPERATURE	LOW temperature detected by ambient temperature sensor.	Reset occurs automatically when the cause ceases or when the unit is switched off.
u 207	HIGH CONDENSER INLET TEMPERATURE	Temperature measured by condenser inlet sensor, fumes sensor or generator fin sensor HIGH.	Reset occurs automatically when the condition that generated the code ceases.
E 207	HIGH CONDENSER INLET TEMPERATURE	u_07 code active for 1 hour, or u_07 code generated 12 times in 2 hours of operation.	Carry out appropriate checks. Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.
E 208	FLAME CONTROL UNIT ERROR	E_12 on unit and condenser inlet temperature increasing by over 10 °C within 1 hour.	Carry out appropriate checks. Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.
u 210	INSUFFICIENT COLD WATER FLOW	Insufficient water flow (the circulator is on and the flowmeter is open).	Reset occurs automatically when correct water flow is restored.
E 210	INSUFFICIENT COLD WATER FLOW	u_10 code generated 5 times since appliance powered, or code u_10 is active for 1 hours.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.
u 211	INSUFFICIENT ROTATION OF OIL PRESSURE PUMP	Insufficient rotation of oil pressure pump.	Reset occurs automatically 20 minutes after the Code is generated.
E 211	INSUFFICIENT ROTATION OF OIL PRESSURE PUMP	u_11 code generated twice in 2 hours of operation.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.
u 212	FLAME CONTROL UNIT ARREST	Failure to ignite burner.	Reset occurs automatically when the solenoid valve opens again (new ignition attempt), or if the code persists for 5 minutes.
E 212	FLAME CONTROL UNIT ARREST	Flame arrest signal.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 0). If the code persists, contact authorised TAC.
E 216	COLD OUTLET WATER TEMPERATURE SENSOR DEFECTIVE	Fault (interruption or short circuit) on outlet water temperature sensor.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.
E 217	COLD INLET WATER TEMPERATURE SENSOR DEFECTIVE	Fault (interruption or short circuit) on condenser outlet temperature sensor.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.
E 220	CONDENSER INLET TEMPERATURE SENSOR DEFECTIVE	Fault (interruption or short circuit) on condenser inlet temperature sensor.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.
E 222	WATER FLOWMETER FAULT	Water flowmeter fault.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.
E 223	AIR/GAS MIXTURE SENSOR FAULT	Air gas mixture sensor fault.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.
E 224	FUMES TEMPERATURE SENSOR FAULT	Fumes temperature sensor fault	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.
E 225	CONDENSATE DISCHARGE CLOGGED	Condensate discharge clogged	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.
E 226	GENERATOR FIN TEMPERATURE SENSOR	Generator fin temperature sensor	Reset may be performed from the controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
E 228	GAS SOLENOID VALVE EXCITED DURING FLAME CONTROLLER ARREST	The flame controller is arrested (E_12) but the gas solenoid valve is excited. In this case the flame controller is de-excited (E_12 resets).	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.
u 229	GAS SOLENOID VALVE WITHOUT ELECTRICAL POWER	Gas solenoid valve is off for 5 seconds (with central flame control unit on).	Reset occurs automatically if the gas solenoid valve switches on again within 10 minutes (with central flame control unit on).
E 229	GAS SOLENOID VALVE WITHOUT ELECTRICAL POWER	Code u_29 is active for more than 10 minutes (with flame controller unit on).	Carry out appropriate checks. Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.

CODES	DESCRIPTION	TRIP CONDITIONS	RESET METHOD
u 236	BLOWER FAULT	Blower fault	Reset occurs automatically 20 minutes after the operating code is generated.
E 236	BLOWER FAULT	u_36 code generated three times in 1 hour of operation.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.
u 246	HOT INLET WATER TEMPERATURE TOO HIGH	Hot inlet water temperature higher than upper operating limit of the appliance (if the appliance is in operation).	Resets automatically if, with the circulator on, the cause resolves or (with circulator off) 20 minutes after generation of code.
u 247	LOW HOT WATER TEMPERATURE	Hot water temperature lower than lower operating limit of the appliance (if the appliance is in operation).	Reset occurs automatically when cause resolves or 430 seconds after the code is generated.
E 247	LOW HOT WATER TEMPERATURE	u_47 code generated 3 times in 1 hour of operation of the circulator.	Reset occurs automatically when the condition that generated the code ceases. If the code persists, contact authorised Technical Assistance.
u 248	HOT WATER DIFFERENTIAL TEMPERATURE TOO HIGH	High hot water differential temperature.	Reset occurs automatically 20 minutes after the operating code is generated.
E 248	HOT WATER DIFFERENTIAL TEMPERATURE TOO HIGH	u_48 code generated twice in 2 hours of operation.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1).
E 249	SATELLITE BOARD NOT PRESENT	Satellite board not present.	Reset occurs automatically when the condition that generated the code ceases.
u 251	ANTIFREEZE FUNCTION ACTIVATED - COLD SIDE Activation takes place only if the plant water circulator is off and the antifreeze function is enabled (see menu 1, parameter 77).	Inlet or outlet water temperature of the cold module falls below 4°C (the code generated signals that the antifreeze function has been activated). In this case the antifreeze function activates the plant water circulator.	Reset (deactivation of antifreeze function) occurs automatically when, with only the circulator on, the inlet and outlet water temperatures return to over 5°C (in this case the circulator switches off), or if the function itself is disabled.
u 275	INSUFFICIENT HOT SIDE WATER FLOW	On the hot side, the circulator is on and the flowmeter is open for 5 seconds (insufficient water flow).	The warning automatically resets when the circulator switches off or the flow meter closes for 5 seconds.
E 275	INSUFFICIENT HOT SIDE WATER FLOW	At the fifth u_75 from machine power supply, or after two hours of u_75 presence, the error is generated.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1).
E 276	HOT WATER DELIVERY TEMPERATURE PROBE FAULT.	Fault (interruption or short circuit) on outlet hot water temperature sensor.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1).
E 277	HOT WATER RETURN TEMPERATURE PROBE FAULT.	Fault (interruption or short circuit) on inlet water temperature sensor.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1).
u 278	OUTLET HOT WATER TEMPERATURE TOO HIGH	Outlet hot water temperature too high	Reset is automatic and occurs when the condition that generated it ceases to apply.
u 279	DEFROST FUNCTION ACTIVATED - HOT SIDE Activation takes place only if the hot module is off and the antifreeze function is enabled (see menu 1, parameter 163).	Antifreeze function activated (with function enabled: see menu 1, item163; and only with machine off). In this case the antifreeze function activates the plant water circulator. If this temperature falls further to below 3 °C, the function also activates the flame controller.	Resets automatically (defrost function disabled) if, with only the circulator operating, the hot water inlet/outlet temperature rises above 5°C (at which point the circulator switches off); or, if also the flame controller is on, when the temperature reaches 18 °C (in this case the flame controller and then the circulator switch off).
u 280	INCOMPLETE PARAMETERS	Incomplete parameters.	The code remains until operating parameters are entered and completed. Contact authorised Technical Assistance. If the board is replaced, Code E 80 may appear; this means that the unit's characterisation parameters have not been set.
E 80/280	INVALID PARAMETERS	Invalid parameters or damage to parameter memory.	Reset occurs automatically when correct parameters are entered. If the code persists, contact authorised Technical Assistance: if the parameters are incorrect, it is necessary to enter and complete the unit operating and characterisation parameters; if the memory is damaged, the controller must be replaced.
u 281	INVALID BANK 1 PARAMETERS	Invalid Bank 1 data - Bank 2 data OK.	Reset occurs automatically 5 seconds after the code is generated.
E 281	INVALID BANK 1 PARAMETERS	The program attempts to resolve the problem by writing the second page over the first; if after 5 attempts this fails, the error is generated.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.
u 282	PARAMETRI BANCO 2NON VALIDI	Invalid Bank 2 data - Bank 1 data OK.	Reset occurs automatically 5 seconds after the code is generated.
E 282	INVALID BANK 2 PARAMETERS	The program attempts to resolve the problem by writing the first page over the second; if after 5 attempts this fails, the error is generated.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.
E 284	FAULTY TRANSFORMER CONNECTION OR 24 V AC FUSES	Damage to one of the 2 24-0-24 V AC transformer fuses, or one of 24-0-24 V AC wires to the board not supplying current.	Check fuses and 24-0-24 V AC electrical power connections on the controller. Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists or occurs again, contact authorised TAC.
E 285	INCORRECT MODULE TYPES (from menu 6)	The set module type (from menu 6) does not correspond to the one managed by the controller.	Reset occurs automatically when correct parameters are entered. If the code persists, contact authorised Technical Assistance.
E 286	MEMORY TEST UNSUCCESSFUL	Processor error.	Contact authorised Technical Assistance.
E 287	MEMORY TEST UNSUCCESSFUL	Processor error.	Contact authorised Technical Assistance.
E 288	MEMORY TEST UNSUCCESSFUL	Processor error.	Contact authorised Technical Assistance.
E 289	MEMORY TEST UNSUCCESSFUL	Processor error.	Contact authorised Technical Assistance.
E 290	AMBIENT TEMPERATURE SENSOR DEFECTIVE	Interruption or short circuit of ambient temperature sensor.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists, contact authorised TAC.
E 291	CONTROLLER DEFECTIVE	One of the following is absent: serial number of board, hardware version code or encryption key written during board test.	Contact authorised Technical Assistance.

TABLE OF OPERATING CODES generated by the S61 electronic board (firmware version 3.024)

DECLARATION OF CONFORMITY

Figure 1

ROBUR

EC – DECLARATION OF CONFORMITY

CE

Manufacturer : Robur S.p.A.
Address : Via Parigi 4/6
City, Country : Verdellino/Zingonia 24040 (Bg), Italy

This is to declare that the ROBUR Gas Absortion Heat Pump (GAHP) are in conformity with the following EC-Directives:

2006/42/EC Machinery Directive with subsequent amendments and integrations.

2004/108/EC Electromagnetic Compatibility with subsequent amendments and integrations.
Tested and examined according to the following norms: EN55014-1, EN55014-2, EN61000-3-2, EN61000-3-3, EN62233.

2006/95/EC Low Voltage Directive with subsequent amendments and integrations.
Tested and examined according to the following norms: EN50165, EN60335-2-102, EN60335-1.

2009/142/EC Gas Appliance Directive with subsequent amendments and integrations.
Tested and examined according to the following norms: EN 12309-1. EN 12309-2, EN 483.
As proved whit EC certification number 0964, issued by KIWA Italia S.p.A Via G. Carducci,5 Milan-Italy

97/23/EC Pressure Equipment Directive with subsequent amendments and integrations.
As proved with EC Certification number 1370 of all the components under pressure of the III° category, issued by BUREAU VERITAS Italia S.p.A. Viale Monza, 261 Milan-Italy

Jvan Benzoni
R&D Director
Robur S.p.A.

Robur S.p.A. tecnologie avanzate per la climatizzazione advanced heating and cooling technologies www.robur.it robur@robur.it
via Parigi 4/6 24040 Verdellino/Zingonia (BG) Italy T +39 035 888111 F +39 035 884165 capitale sociale € 2.028.000,00 i.v. iscritta al Registro Imprese di Bergamo n. 154968 codice fiscale/partita iva 00373210160 V.A.T. code IT 00373210160 società soggetta all'attività di direzione e coordinamento di Fin Robur S.a.p.A. di Benito Guerra & C.

Figure 2

ROBUR

Dichiarazione di Conformita' n°:
Declaration of Conformity n°:
Déclaration de conformité n°:
Konformitätserklärung N°:
Declaración de Conformidad n°:
Verklaring van conformiteit n°:

Zingonia, li/den 14/12/2011

IT

Con la presente si dichiara che i circuiti a pressione:

1. del Refrigeratore d'acqua a gas ad Assorbimento prodotto da ROBUR S.p.A., **serie GA:** ACF60-00 (standard e versioni speciali);
2. delle Pompe di Calore a gas ad Assorbimento prodotte da ROBUR S.p.A., **serie GAHP:** GS, WS, A, AR (standard e versioni speciali); **serie GAS HP:** G, W, A (standard e versioni speciali);

rispondono ai requisiti richiesti dalla Direttiva sulle attrezzature a pressione 97/23/CE (PED) come comprovato dal Certificato CE di Valutazione di Conformità nell'Insieme:

- MODULO H, Garanzia Qualità Totale, numero **CE-1370-PED-H-ROB001-10-ITA**

Rilasciato da:

BUREAU VERITAS ITALIA S.p.A.
Viale Monza 261
20126 Milano - Italy

Si precisa che tali circuiti sono dotati di una valvola di sicurezza (pressione di taratura 35 bar) conforme ai requisiti della stessa Direttiva 97/23/CE (PED).

D-FGL073 rev.F 11 MCM SDC 030 del 14/12/2011

Robur Spa tecnologie avanzate per la climatizzazione advanced heating and cooling technologies www.robur.it robur@robur.it
via Parigi 4/6 24040 Verdellino/Zingonia (Bg) Italy T +39 035 888111 F +39 035 884165

Figure 3

ROBUR

UK

We hereby declare that:

1. pressurized circuit of the Gas Absorption Chiller manufactured by ROBUR S.p.A., **series GA:** ACF60-00 (standard and special versions);
2. pressurized circuit of the Gas Absorption Heat Pump manufactured by ROBUR S.p.A., **series GAHP:** GS, WS, A, AR (standard and special versions); **series GAS HP:** G, W, A (standard and special versions);

comply with Pressure Equipment Directive 97/23/EC (PED) requirements, as proofed with EC Certification of all the components under pressure:

- MODULE H for "Total Quality Assurance", number **CE-1370-PED-H-ROB001-10-ITA**

Issued by:

BUREAU VERITAS ITALIA S.p.A.
Viale Monza 261
20126 Milan- Italy

In particular, these circuits are equipped with one safety valve (pressure gauge set at 35 bar) conforming to the requirements of 97/23/EC (PED) Directive.

FR

Nous déclarons par la présente que les circuits hermétiques pressurisés:

1. des unités à Absorption à gaz fabriquées par la Société ROBUR S.p.A., **série GA:** ACF60-00 (standard et versions spéciales);
2. des Pompes à Chaleur à Absorption à gaz fabriquées par la société ROBUR S.p.A., **série GAHP:** GS, WS, A, AR (standard et versions spéciales); **série GAS HP:** G, W, A (standard et versions spéciales);

répondent à la Directive sur les appareils sous pression 97/23/EC (PED) comme d'après le Certificat CE d'Evaluation de l'Ensemble sous Pression:

- MODULE H, "GARANTIE QUALITE TOTALE", numéro **CE-1370-PED-H-ROB001-10-ITA**

Délivré par:

BUREAU VERITAS ITALIA S.p.A.
Viale Monza 261
20126 Milano – Italy

Nous précisons que ces circuits sont équipés d'une soupape de sécurité (pression de réglage 35 bar) conformément à la Directive 97/23/EC (PED).

DE

Hiermit erklären wir, daß die hermetischen Kreisläufe:

1. der gasbefeuerte Absorptionskältemaschine , produziert durch ROBUR S.p.A., **Typ GA:** ACF60-00 (Standard und in den verschiedenen Ausführungen);
2. der Gasabsorptionswärmepumpe, produziert durch ROBUR S.p.A., **Typ GAHP:** GS, WS, A, AR (Standard und in den verschiedenen Ausführungen); **Typ GAS HP:** G, W, A (Standard und in den verschiedenen Ausführungen);

den Anforderungen der Druckbehälterverordnung 97/23/EC (PED) entsprechen und hiermit die EC Zertifizierung erfüllen im Ganzen:

- MODUL H, umfassende Qualitätssicherung **CE-1370-PED-H-ROB001-10-ITA**

Ausgestellt von:

BUREAU VERITAS ITALIA S.p.A.
Viale Monza 261
20126 Milano – Italy

Hiermit möchten wir klarstellen , daß diese Behälter mit einem Sicherheitsventil (Eichungsdruck 35 bar) nach 97/23/EC (PED) Verordnung ausgerüstet sind.

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Figure 4

ROBUR

ES

Por la presente certificamos que los circuitos herméticos presurizado:

1) de las Máquinas de Absorción con gas fabricadas por la Empresa ROBUR S.p.A., **serie GA:** ACF60-00 (Standard y versiones especiales);
2) de las bombas de calor por ciclo de absorción con gas fabricadas por la Empresa ROBUR S.p.A., **serie GAHP:** GS, WS, A, AR (Standard y versiones especiales); **serie GAS HP:** G, W, A (Standard y versiones especiales);

se adaptan a la Directiva 97/23/EC (PED) sobre aparatos a presión, y han sido probados conforme al procedimiento EC en conjunto:

- MODULO H, control de aseguramiento de calidad total, número **CE-1370-PED-H-ROB001-10-ITA**

Efectuados por:

BUREAU VERITAS ITALIA S.p.A.
Viale Monza 261
20126 Milano - Italy

Se precisa que estos circuitos están equipados de una válvula de seguridad (presiòn de calibraciòn 35 bar) conforme a lo establecido en la Directiva 97/23/EC (PED).

NL

Hierbij verklaren wij dat de drukcircuiten:

1) van de GasAbsorptie Koelers geproduceerd door ROBUR S.p.A., **serie GA:** ACF60-00 (standaard e speciale versies);
2) van de Gasabsorptiewarmtepomp geproduceerd door ROBUR S.p.A., **serie GAHP:** GS, WS, A, AR (standaard en speciale versies); **serie GAS HP:** G, W, A (standaard en speciale versies);

voldoen aan de voorwaarden van de Pressure Equipment Directive 97/23/EC (PED), zoals gecertificeerd door EC Certificaat voor alle componenten onder druk:

- Module H, Totale Qualiteits Garantie, nummer **CE-1370-PED-H-ROB001-10-ITA**

Gepubliceerd door:

BUREAU VERITAS ITALIA S.p.A.
Viale Monza 261
20126 Milaan-Italie

In het bijzonder is dit circuit uitgerust met een veiligheidsventiel (drukmeter op 35 bar) volgens de eisen van de 97/23/EC (PED) richtlijn.

ROBUR S.p.A.
Ing. Davide Schiavon
Quality and Safety Manager

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coscienza ecologica caring for the environment

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